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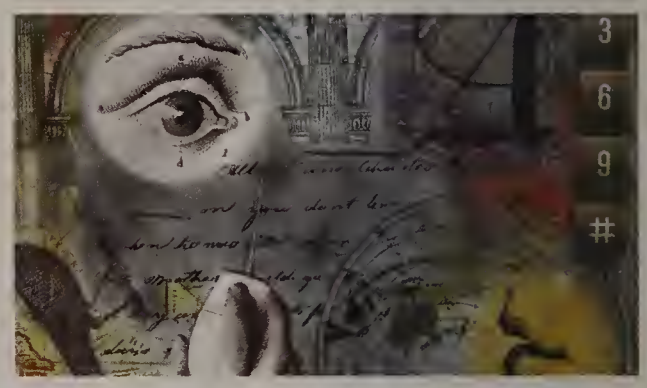

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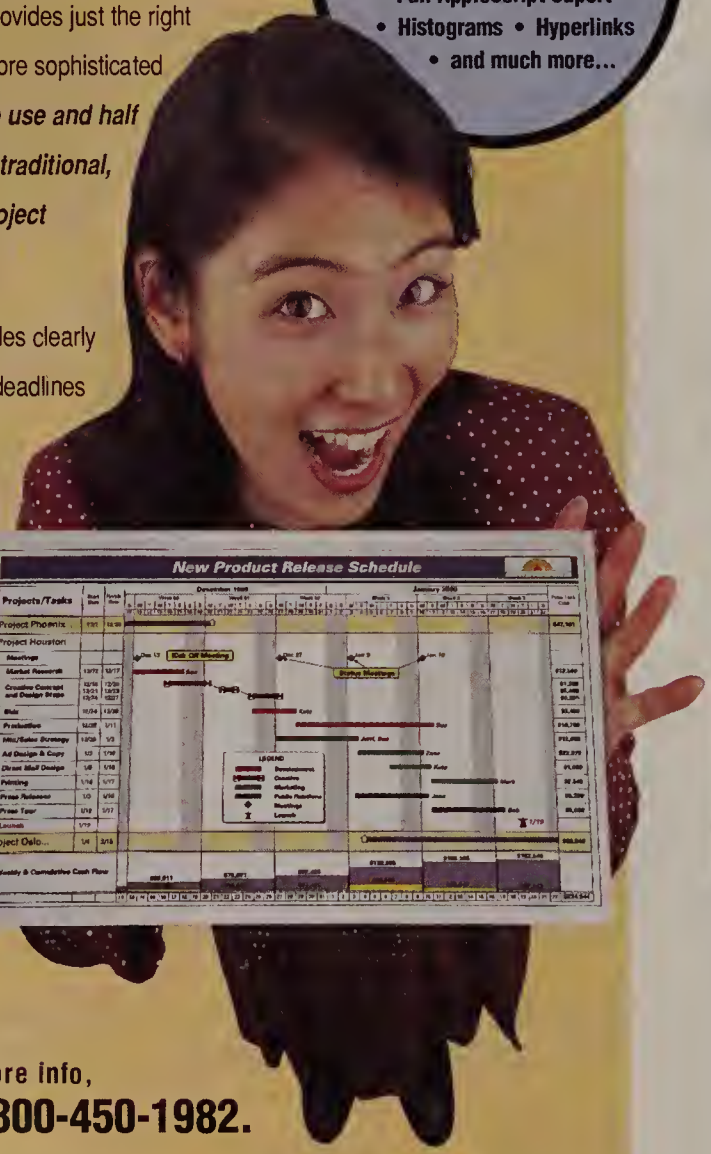

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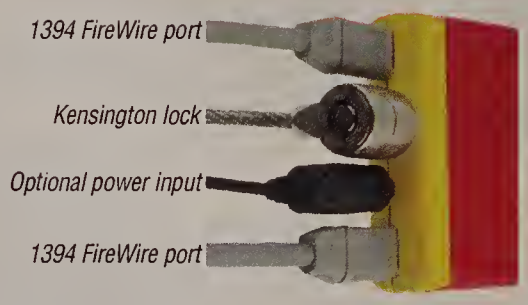

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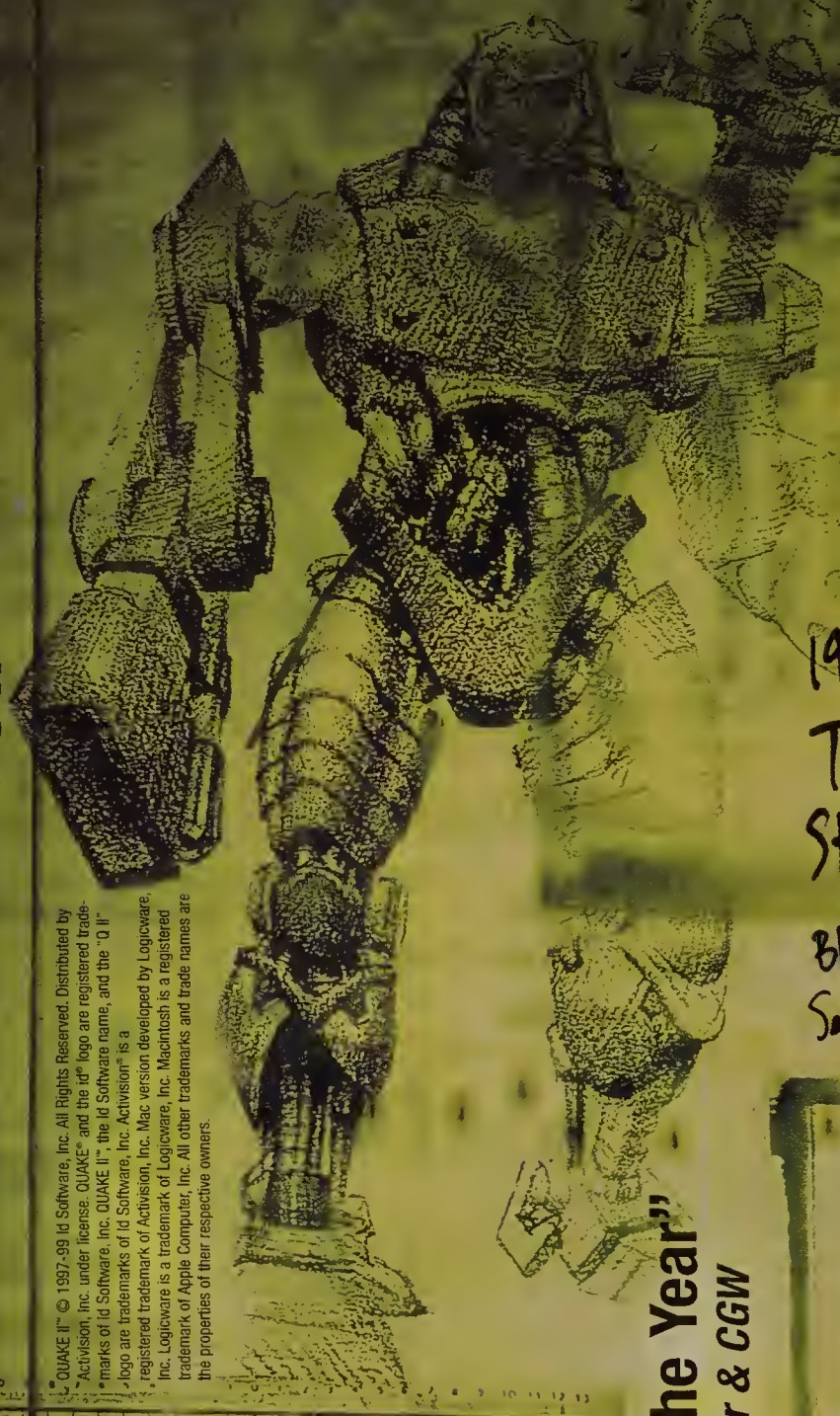
19:42 You learn the hard way in the outer sectors... Like never get into a drinking battle with a three-headed Bukan. Never assume a Strogg is dead even when he's nothing but steaming scraps of shrapnel. And never go to bed with a Rabaul no matter how many breasts she has.



19:11

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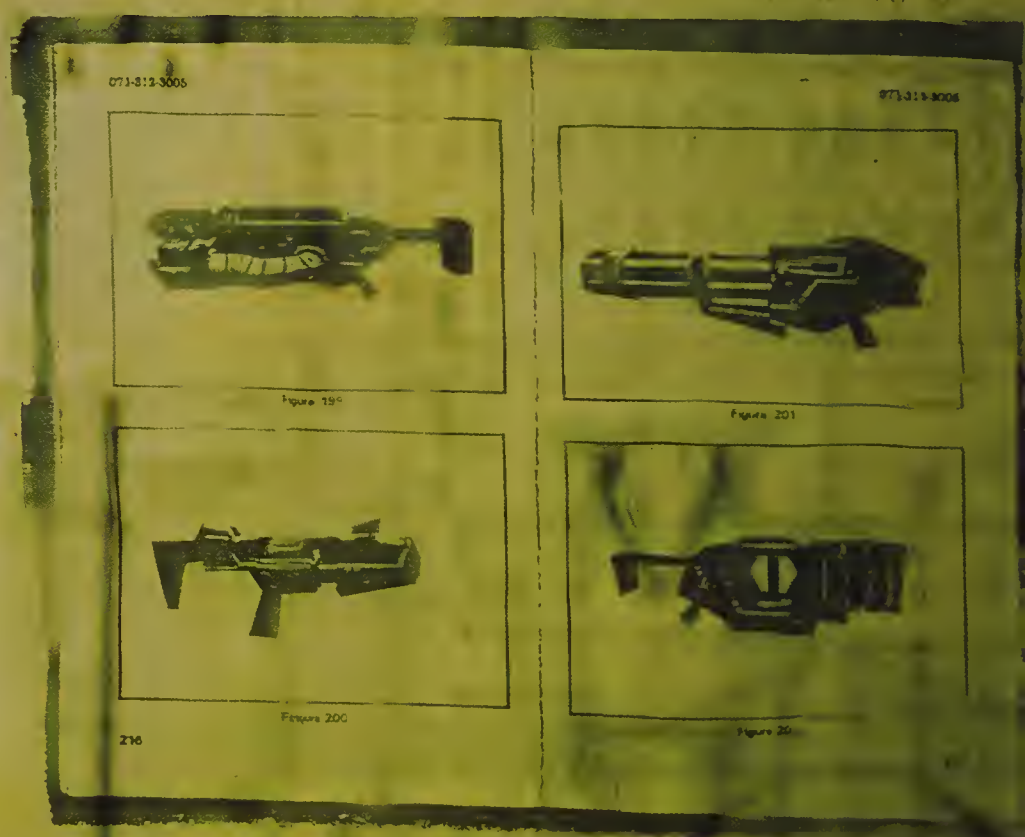

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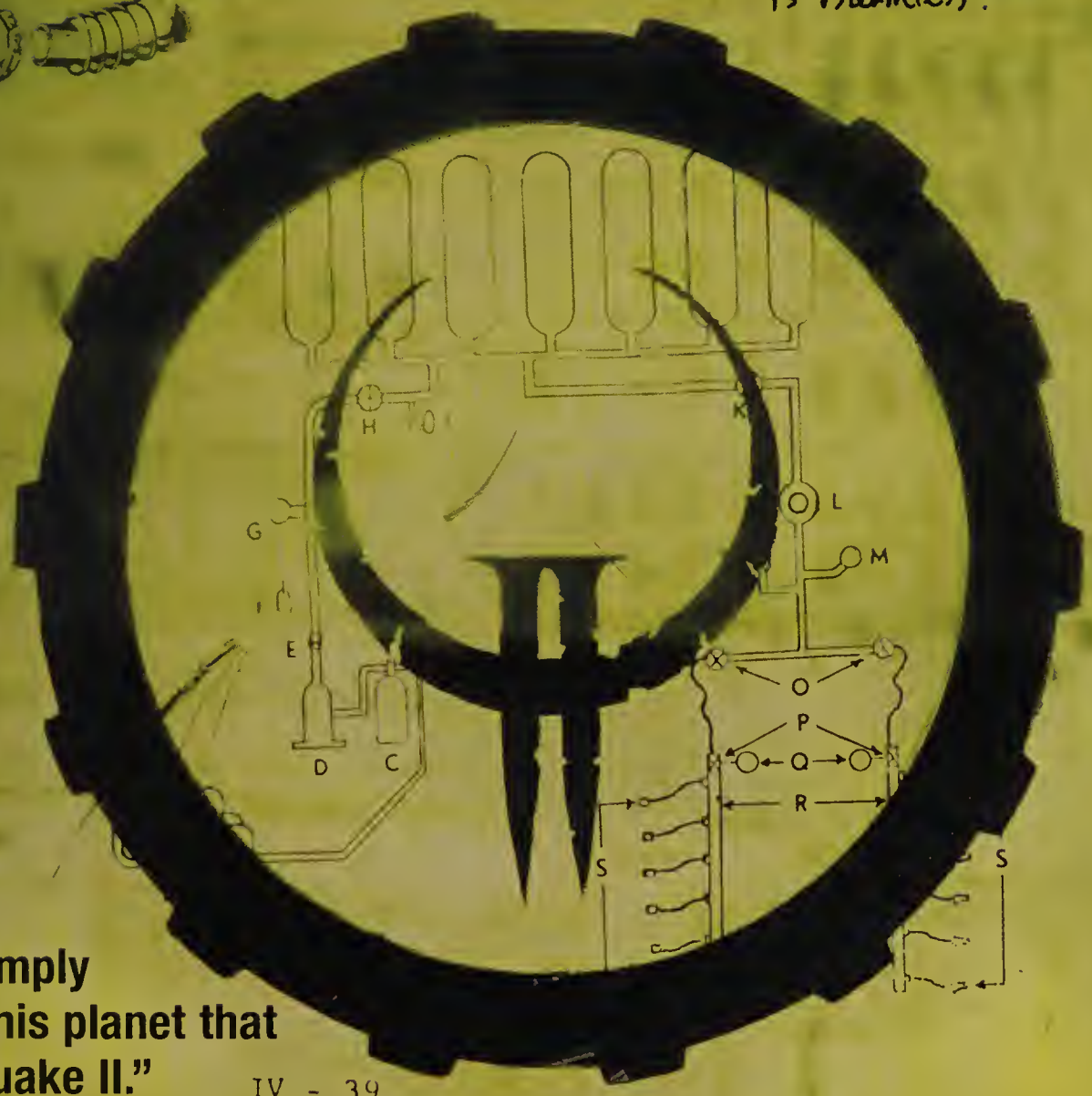
17:05 It's either us or them this time. We lose, and we all end up bratwurst on the grill of some undead mechanized carnivore. We win, and the human Coalition of Mars, Olympus, even Earth. Who knows - they might even get the old interplanetary football league going again. God, I miss Monday Night Football.

18:03 Gothesque images of Strogg's have been filling my sleep at night. Their metallic spines jutting awkwardly through muscle, skin and connective tissue, masks of human facial skin smeared and bonded to their cyber-alloy heads, crude but powerful weapons jammed into oozing, gaping sockets. Thank God the endless sleep ahead is dreamless.



"...there's simply nothing on this planet that can touch Quake II."
— PC Gamer

IV - 39

QUAKE II™

SONY

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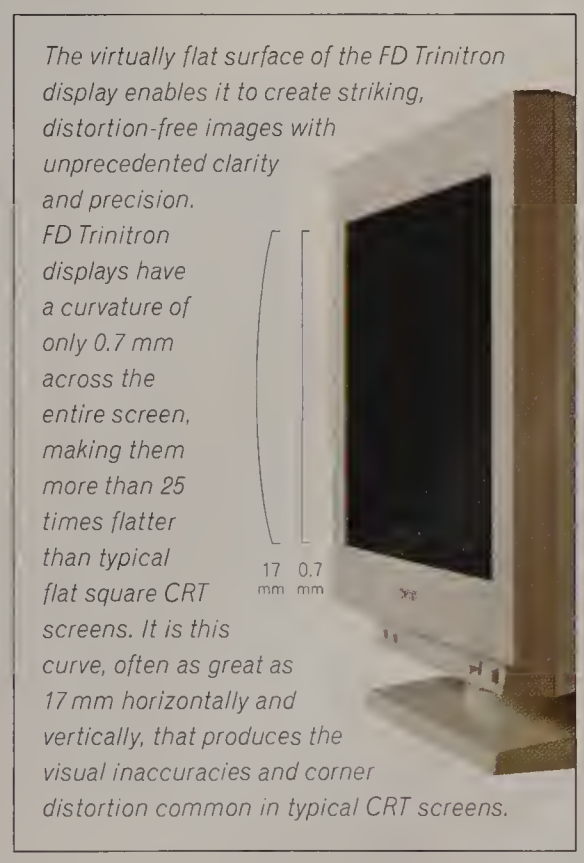
Michael Lapkin of Microsoft has selected the FD Trinitron display for its first technology showcase, microsoft®SF.

When microsoftSF opens its doors this year, it will showcase its graphic professional software on the stunning new FD Trinitron displays from Sony. Located at Metreon in San Francisco, microsoftSF was created to provide a unique environment in which to interact with Microsoft's cutting-edge products. To present their graphics software in a dramatic and impactful manner, microsoftSF chose Sony's flattest, most accurate CRT screens ever, the new FD Trinitron displays.

The virtually flat FD Trinitron display series is the most revolutionary advancement in image technology since the invention of Trinitron technology in 1968. Web designers will enjoy the superior resolution. CAD professionals will appreciate the precision of the tight aperture grille pitch. And graphic designers will be dazzled by the truer, brighter colors. So whether it's the 19" or 21" model (18" and 19.8" VIS), the FD Trinitron display makes an immeasurable impression.



The virtually flat surface of the FD Trinitron display enables it to create striking, distortion-free images with unprecedented clarity and precision. FD Trinitron displays have a curvature of only 0.7 mm across the entire screen, making them more than 25 times flatter than typical flat square CRT screens. It is this curve, often as great as 17 mm horizontally and vertically, that produces the visual inaccuracies and corner distortion common in typical CRT screens.

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JUNE 1999

Letters

InCompetentUSA

DAVID POGUE'S MARCH 1999 *Desktop Critic* column, "CompUSA: Apple's Not-So-Superstore," was right on target.

I was recruited from our local Macintosh user group as an official Apple representative for the iMac introduction and the OS 8.5 rollout at a CompUSA in Colorado. When I arrived at the store, I introduced myself to the manager. He said that he didn't care about Macs, didn't know anything about Macs, and as far as he was concerned I was wasting his time.

Several Mac customers indicated that the Apple Store-Within-a-Store at this CompUSA was usually used for storage of overflow PC merchandise, and they were left to find what they needed on their own.

For a program of this type to be successful, there must be a positive attitude on the part of store management. Hype at the corporate level means nothing if the store managers have a negative attitude and short-circuit corporate policy with their condescension.

WILLIAM C. ROEMER
Fort Collins, Colorado

MY EXPERIENCES WITH COMPUSA have been almost identical to David Pogue's. At the store in San Marcos, California, I asked several questions about the iMac and received less-than-stellar answers. Finally, I started asking the young salesperson questions that he could have answered if he had just turned around and read the advertisement behind him. He failed miserably. I tried again at the new store in Encinitas and received the same results. Whatever Apple is paying this company to sell its products is too much by a factor of ten.

EDWARD L. LANE
Oceanside, California

JEFF NEUMANN

AT LEAST MR. POGUE WAS ABLE TO talk with a salesperson. When I went to buy Apple's LaserWriter 8500, I couldn't get anyone to wait on me. CompUSA's treatment of Mac customers is abhorrent. As an Apple Computer shareholder, I find this situation intolerable.

KEITH A. RUST
Saint Paris, Ohio

Blues for the G3

THE NEW G3 IS CUTE, ISN'T IT ("iMac Envy," March 1999)? And those handles—if it only had a set of wheels on one end, we could tote it around like luggage! Is there some future integration yet to be announced for these impressive yet mysterious design additions? Do they imply that I need to carry this machine often? Do I need to lift it every day? Maybe it's an attempt to start some new exercise trend—Macxersize!

The new G3 case is a bad design. My desktop is packed with hardware. I can't spread out anymore, so I rely on stacking components to save space. I put peripherals on top of my PowerPC Mac, which allows me to use short SCSI cables. I wish these designers would look more closely at the environmental needs of Mac users and design hardware that doesn't incorporate useless obtrusive elements. Work with a Mac every day for a living, and then tell me you still have enough room on your desk to accommodate retrograde ergonomic design—like handles.

TROY KILGORE
Bloomington, Indiana

IT SEEMS APPLE HAS GONE AND done it again: they took two steps forward and three steps back.

When it came time to look seriously at purchasing a machine for digital-audio applications, I decided that the Mac was for me. A salesperson recommended two options: look for a used 9500 or 9600 or wait and see what the new G3s come with. The new G3s appear to have so much going for them (improved bus speed, FireWire and USB ports, ATI Rage 128-bit graphics, great price point) that stepping up to one seems like an easy decision.

Easy, that is, until you start to dig deeper, and discover that Apple decided to drop many of the features that made the original G3s attractive in the first place: the new G3s have no serial ports, no built-in video, no floppy-disk drive, a lack of expansion slots, and no SCSI!

Every time Apple gets a good thing going, they get clumsy. And they certainly did it again this time. A great new machine, hobbled by a lack of expansion and the connections people use every day.

WILLIAM T.B. LATANVILLE
Toronto, Ontario, Canada

continues

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Complete Canvas

BEN LONG MISSED THE TWO MOST important features of Deneba Canvas 6 in his recent review (*Reviews*, March 1999). First, with Canvas I can create high-end output in one program—instead of using Adobe Photoshop, PageMaker, and Illustrator—and without all the hassle. Second, I have been released from the "Adobe extortion program"—each year I fork out about $169 to $189 for upgrades to each program! Canvas gives me the output that I need, I save a bundle, and I get the same results, if not better.

D CHRIS HALEY
Middleville, New York

Slower Than the IRS

DID JOHN RIZZO REVIEW A DIFFERent version of MacInTax Deluxe '98 from the one those of us who bought the product in the open market have (*Reviews*, March 1999)? When using the Interview mode, the program slows to an unacceptable level—easily two minutes or longer to launch or close the application, plus additional minutes to switch to each subsequent interview entry box—on both G3s and 68040s. Read the comments on Intuit's own Web site. This is either an example of Intuit's complete lack of quality assurance or their utter disdain for the Mac market.

RICHARD GLANTZ
Lexington, Massachusetts

Infectious Virex

IN HIS REVIEW OF VIRUS-PROTECtion software, Stephan Somogyi mentioned that Norton AntiVirus has a straightforward interface (*Reviews*, March 1999). I disagree. I tried a demo version of Symantec AntiVirus (now NAV), and I feel that Virex is a much better choice. NAV did the job, but it was very intrusive, and I did not like the interface as much as Virex's. Virex's interface is not perfect, but it's easy to use and understand.

I used Virex 5.8.1 for several months, and it did a great job. After two months or so of my using version 5.8.1, Virex revved to version 5.9. I contacted Network Associates and they sent it to me free!

Somogyi complained that Virex did not offer an automatic upgrade feature, but he also noted that this feature for NAV is flawed. Anyone who knows how to use a Web browser can get the free upgrades for Virex via the Web. It sounds like Somogyi's a NAV fan. I bet he also prefers PCs.

ARTIE EVANS
Riva, Maryland

Go beyond the Root

STEPHAN SOMOGYI'S REVIEW OF the OrangePC 627 overlooks a major software limitation (*Reviews*, March 1999). You can share a folder from your Mac so that it appears on the PC as a network volume (allowing you to work on the file on both platforms), but you are limited to the outdated DOS "8.3" file-name convention. Worse, you can use only files located in the root directory of the shared volume! I tried many fixes, including adding a second Ethernet card and mounting a trial version of Dave.

Fortunately, a workaround exists. The PC will recognize all files and subdirectories on a floppy or an external SCSI device, such as a Zip drive—even files with long names. The only apparent limitation is that sometimes you have to eject and reinsert the disk when switching OSs so that the new OS can recognize changes made to files. Since discovering this, I've been quite pleased with my Orange. Of course, it's still no Mac, but that's comparing Apples and Oranges.

SCOTT OWENS
Gaithersburg, Maryland

Orange Micro says it is aware of the file-name and shared-volumes problems. It is planning a 32-bit version of the shared-volumes software, which should fix the problem. In the meantime, Scott's workaround will do the trick.—Ed.

Microsoft Makes Good

MICROSOFT INTERNET EXPLORER (IE) 4.5 is amazing ("Internet Explorer Gets Back to Basics," *News*, March 1999). Fast, compact, and reliable, it's such a huge leap over what browsers used to be just a year ago, and a fine piece of software to boot. IE plain cooks on my old Power Mac 7600/132 here at home; at work we

continues

Sleek, voracious, efficient, smart– and able to kick anybody's butt in the pond.

(No, we're talking about the Intuos graphics tablet system.)

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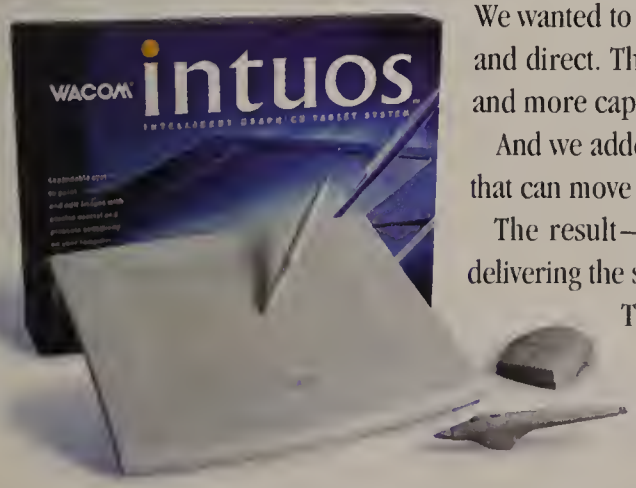

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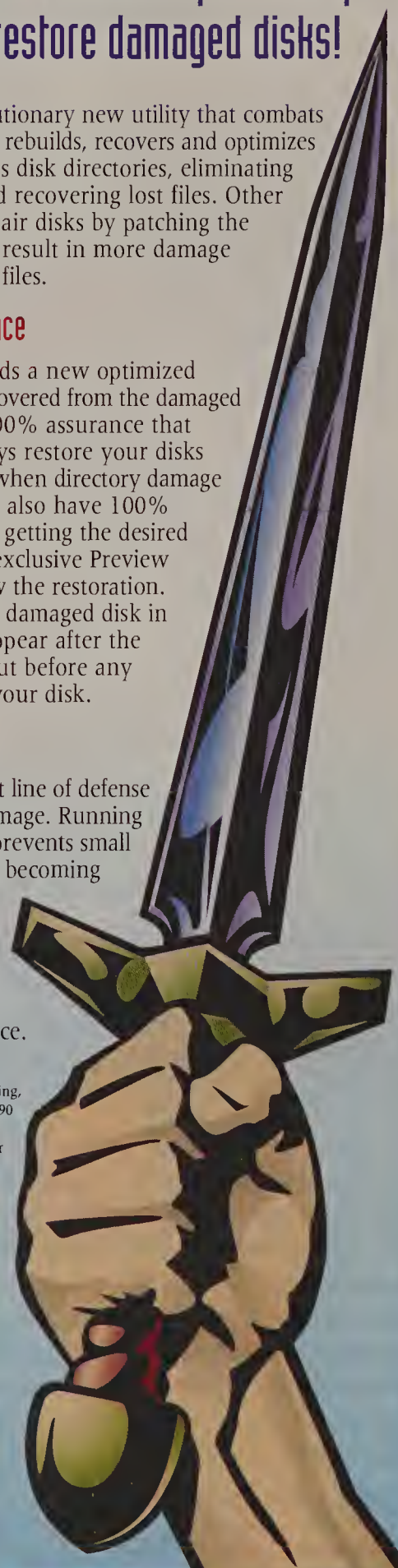
DiskWarrior is your first line of defense against unseen disk damage. Running DiskWarrior regularly prevents small unseen problems from becoming large ones by keeping your directories error free. You'll also keep your directories optimized to speed up overall disk performance.



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run IE 4 on Windows NT and it is terrible, an utterly lifeless piece of software. What's going on? Face the facts. Microsoft the Great is starting to consider the Mac more seriously. Office? Better on the Mac. IE? Better on the Mac. Now all we need is Flight Simulator 5.

JEFF BAYNARD
Baltimore, Maryland

How about Banana?

AFTER READING THE ARTICLE "Flavorful iMacs Debut" (*News*, March 1999), I realized where Apple got the five new iMac flavors. If you look at the classic Apple logo, starting at the bottom of the apple the stripes are blue, purple, red, orange, yellow, and green. These correspond to the flavors blueberry, grape, strawberry, tangerine, and skipping yellow, lime. The only flavor I can think of for yellow is lemon, and there is no way that Apple is going to call their product a "lemon"!

TOM JELMELAND
Seal Beach, California

If you're craving a splash of yellow with your iMac, check out Contour Design's (800/462-6678, www.contourdesign.com) banana UniMouse.—Ed.

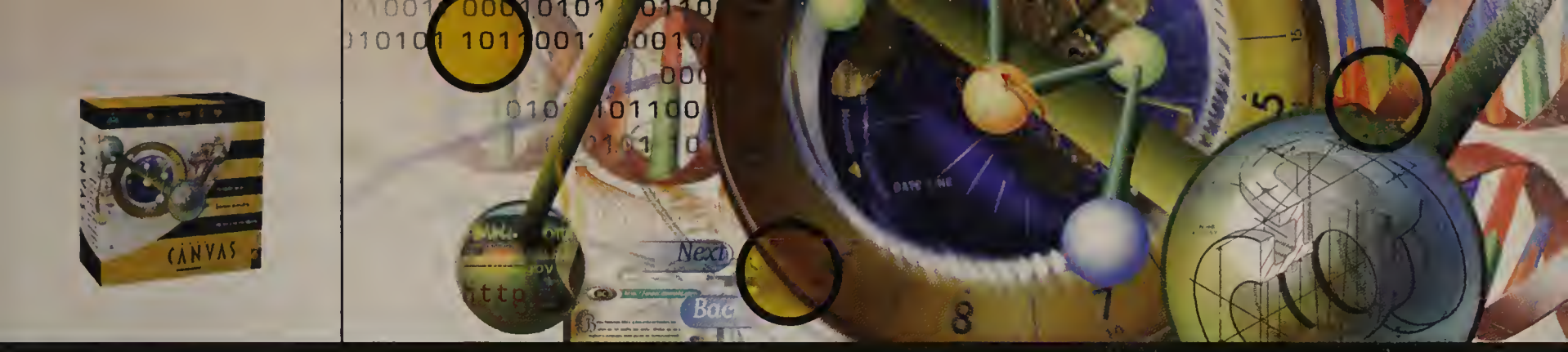
Letters should be sent to *Letters*, Macworld, 301 Howard St., 16th Fl., San Francisco, CA 94105; via fax, 415/442-0766; or electronically, to letters@macworld.com. Include a return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*.

CORRECTIONS

You can print an entire help topic directly in OS 8.5 by opening the File menu and choosing Print ("On the Trail of Mac OS 8.5," March 1999). To copy or print only a selection from the help text, use David Pogue's trick.

Deneba Canvas 6 can apply image adjustments simultaneously on multiple bitmapped objects (Reviews, *March 1999*).

In March 1999's Quick Tips, *the correct name for Joseph C. Lee Company's premade iMac restart gadget is the iMacButton.* m



IT AIN'T BRAGGING IF IT'S TRUE.

(AT THIS RATE WE'RE GOING TO HAVE TO THINK OF SOMETHING ELSE TO CALL THEM BESIDES CRITICS.)

OF COURSE, WE'RE ONLY REPEATING WHAT THE EXPERTS ARE SAYING. CAN WE HELP IT IF THEY GO ON AND ON ABOUT OUR REVOLUTIONARY SPRITELAYER™ TECHNOLOGY AND ITS NEAR MAGICAL ABILITY WITH TRANSPARENCIES? IS IT OUR FAULT THEY'RE SMITTEN WITH CANVAS 6'S KNACK FOR CUT-AWAYS, VIGNETTES AND COLLAGES? WE'RE STILL BLUSHING OVER THE RAVES FOR ITS SNAZZY CUSTOMIZABLE INTERFACE, IMAGE EDITING AND EASE OF USE. GRANTED, WE COULD HAVE KEPT ALL THIS TO OURSELVES. BUT THEN HUMILITY CAN BE HIGHLY OVERRATED.

Canvas 6 now includes
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"Comparing [Freehand, Illustrator and CorelDraw] directly to Canvas is like comparing apples to, well, the whole basket of fruit...In the competition of the graphics titans, Canvas 6 is fighting with a unique set of weapons." **Macworld. February, 1999** "SpriteLayer technology is an excellent piece of programming wizardry. With it, designers can easily experiment with complex graphic ideas that would have been prohibitive or impossible in any other program." **Digital Design and Production. January/February, 1999** "With its elegant interface, Canvas is a compelling alternative to suite-based solutions that require separate illustration and image editing programs to perform the same functions." **PC Magazine. January, 1999** "...A standalone graphics application that skillfully integrates its separate components. Canvas 6's price and its range of tools combine to earn it a place on our WinList." **Windows. March, 1999** "...An integrated, easy-to-use graphics package that's so sophisticated you're not likely to outgrow it... We found Canvas 6's transparency tools alone to be worth the upgrade price." **PC Computing. March, 1999** "The hype is well deserved...Canvas 6 features a variety of transparencies that can significantly bump up the oh-la-la quotient of your images." **MacAddict. April, 1999** "Deneba has done what Adobe has refused to do: unify graphics apps...Canvas 6.0's unique ability to combine disciplines will lead the designer down previously inaccessible creative paths...SpriteLayers composite like no other program can." **Maximum PC. January, 1999** "Canvas 6's array of new transparency tools allows you to create awesome depth and layering in your images – and it does so better than other graphics products on the market today." **MacAddict Magazine.** "Canvas continues to deliver a vast scope of graphics tools in one convenient application, and does a remarkable job of breaking down barriers between bitmap and vector graphics." **PC World Online. December 28, 1998** "...No program comes close to Canvas's ability to combine vector and bitmapped graphics...Canvas 6's strong integration of text, painting and drawing tools makes it a good one-stop graphics application." **Macworld. March, 1999**

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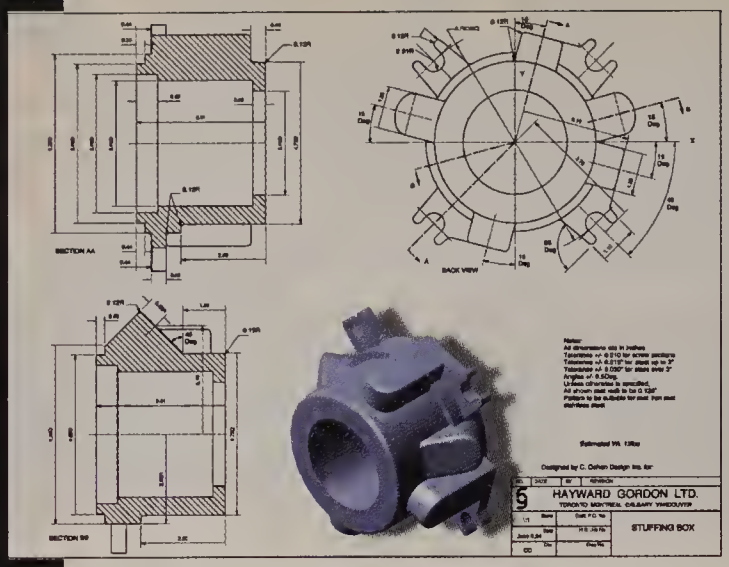

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Charles Duncan, Pty. Ltd.

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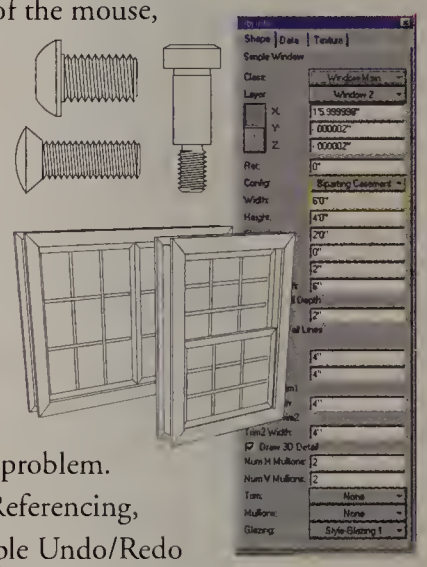

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The Vision Thing

by Andrew Gore

Where's Sherlock?

THE MYSTERY BEHIND A GREAT INTERNET TECHNOLOGY'S STRANGE DISAPPEARANCE

IT IS A MYSTERY WORTHY of the great detective himself. His namesake, Apple's Sherlock, is quite possibly the most easy-to-use search technology available on any platform. Want to find something on the Internet? Type in a simple phrase describing your query and Sherlock will track it down.

Sure, lots of search-engine Web sites can find stuff for you. Some even have simple interfaces, although these are few and far between. What makes Sherlock so special is its ability to use *all* these sites to find what you're looking for. Sherlock is a single interface that encompasses all the varied and diverse search and archival resources on the Web.

But despite its obvious power, simplicity, and uniqueness, Sherlock itself seems to have vanished. No, not from the Mac OS—you still get the search facility in every copy of OS 8.5. I'm talking about Sherlock's apparent removal from Apple's marketing and development plans. Little has been heard from Apple or developers about the technology, with the notable exception of Microsoft, which added a Sherlock button to Internet Explorer 4.5 last January.

Elementary, My Dear Apple

Crime most foul, you say? Let us follow the principles of deductive reasoning used to such great effect by Sir Arthur Conan Doyle's famous sleuth and see if we can ferret out a motive.

Could Apple be unaware of the importance of Sherlock? Unlikely. When OS 8.5 first shipped, Sherlock was the *key* feature the company used to push sales of the upgrade.

So, what could have changed? Could Sherlock have lost its luster in Apple's eyes? Again, unlikely. The company is actually making money off Sherlock every time someone uses it to find something on Amazon.com and then buys that something. Certainly, the potential profit can't be lost on Apple.

Perhaps developers are balking. The most likely developer to have a problem with Sherlock would be Microsoft, which built its own search system into Internet Explorer. Yet Microsoft is one of the very few application developers to support Sherlock directly.

Once you've eliminated the obvious, whatever remains—no matter how unlikely—must be true. It seems, then, the reason for Sherlock's disappearance must be simple neglect. Apple has had so many bigger fish to fry of late that the company hasn't had time to give this impressive technology the benefit of its attention. Which is unfortunate, because with proper support, Sherlock could be to the Internet what QuickTime is to digital video—a critical, platform-agnostic enabling technology.

JOHN RITTER

The Game's Afoot

Allow me now to discard the deerstalker cap, because the time for deducing cause and effect is over. There are three things Apple can do to capitalize on Sherlock, taking it from an interesting sideshow to the juggernaut it deserves to be.

First, Apple must start marketing Sherlock again—not just as part of OS 8.5 but as part of the Mac itself. We've all seen how Apple emphasizes the iMac's simplicity in its commercials; why not tout the simplicity of finding your way around the Internet using Sherlock? I can picture it now: "Step one, launch Sherlock. Step two, tell Sherlock what you're looking for. Step three . . . there's no step three!"

Second, Apple needs to expand Sherlock's bag of tricks with more plug-ins that access more search engines, FTP sites, publication archives, and the like. There should be hundreds of Sherlock plug-ins, not dozens. And before I get letters about how nutty it'll drive you to select from hundreds of plug-ins, I'll add that Apple needs to make Sherlock smarter, so it can select plug-ins by parsing your query.

And while we're at making Sherlock smarter, I'd like to see the intelligence Sherlock uses on searching your Mac's hard-drive contents expanded to encompass the Internet as well. No mean feat, I know. But right now Sherlock is only as good as the search engines it connects to—and we all know how bad some of those are.

Third, Apple must make Sherlock work on Windows. Only when Sherlock is cross-platform can it be truly dominant. And in case Apple is worried about losing money by offering Sherlock to Windows users, the company should remember the money it can make from referrals to e-commerce sites, and how many more Windows users there are than Mac users.

No climactic battle to end this mystery; no unmasking of the evildoer or frustrating near-capture of Dr. Moriarty. To end the mystery of "Where's Sherlock?" we must look to Apple for a solution. **m**

Questions? Comments? E-mail them to Andy at visionthing@macworld.com.

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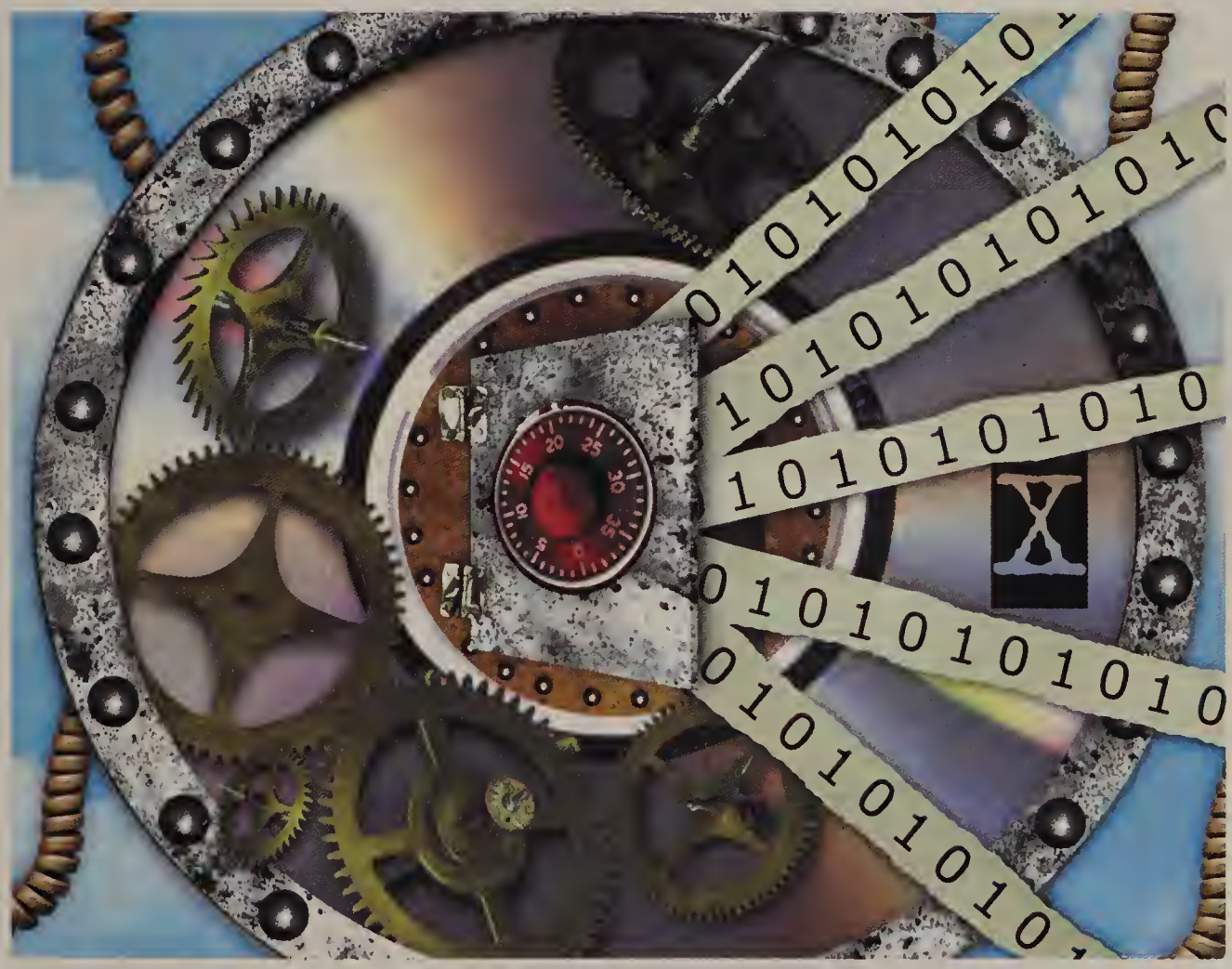
News

systems

Apple Goes Open Source with Mac Server

SURPRISE MOVE WILL ACCELERATE MAC OS DEVELOPMENT EFFORTS

by Stephen Beale



LARRY GOODELL

Apple has once again surprised the computer industry with its recent decision to offer key parts of Mac OS X Server as publicly available source code. Leaders of the open-source movement have praised Apple as the first major computer company to adopt an open-source strategy—the same approach that's made the Linux operating system a popular alternative to Windows NT. But what does this mean for Mac users and future versions of the Mac OS? Plenty, Apple says.

"It's as if we had hired a huge bunch of programmers for free," asserts Ernie Prabhakar, Apple's product manager for Mac OS X Server. "We'll have a final product with better performance and new features."

How It Works Apple has created a subset of Mac OS X Server called Darwin that includes Apple's versions of the Mach 2.5 microkernel, the Berkeley Systems Distribution (BSD) 4.4 version of Unix, the Apache Web server, and such Mac-specific technologies as AppleTalk and the HFS+ file system (see "What's in Mac OS X Server"). Apple has posted the Darwin source code (the underlying programming commands) on its Web site. Developers who agree to Apple's license agreement can download the source code, modify it, and include it in their own products. They don't have to pay royalties or license fees, but they do have to make their source-code modifications publicly available.

Apple is then free to incorporate any changes into future versions of Mac OS X Server—and Mac OS X, which uses the same Darwin components. Apple plans to release Mac OS X, its next-generation client operating system, later this year.

There are other benefits as well. Developers of G3 accelerators for older Macs could theoretically use Darwin to create drivers that would allow those Macs to run Mac OS X, which otherwise requires an Apple G3 Mac. Large Apple customers, especially universities, are now free to customize Mac OS X Server for their own needs. Developers who might otherwise turn to generic versions of Mach 2.5, Apache, and BSD 4.4 Unix—all avail-

continues

Product WATCH

Acrobat Additions Several companies have joined Adobe Systems' Acrobat act with new plug-ins. Enfocus Software's (888/363-6287, www.enfocus.com) $295 PitStop 4.0 performs preflight checks and lets you edit text and objects in PDF files. Quite a Box of Tricks, a $205 PDF utility suite from Quite Software (www.quite.com), features enhanced RGB-to-CMYK conversion and image-reduction features. The company's Quite Imposing Plus, a $599 imposition program, takes advantage of Acrobat's new maximum page size, 200 by 200 inches.

Animated Features Animators can forgo ink and paper with Linker Systems' (949/552-1904, www.linker.com) $5,000 Animation Stand Pro 4.0. New features in the cel-based 2-D animation software include automatic color correction and support for combined simultaneous moves and effects.

Unplugged Now you can use Adobe Photoshop plug-ins even if you don't have Photoshop. Vertigo Software's (604/684-2113, www.vertigo3d.com) $39 Advertizer Web-graphics utility lets you create banners by importing an image and applying Photoshop plug-in effects.

Direct Savings Looking for a new screen saver? Create your own with CinéMac 1.5. This $299 Macromedia Director Xtra from MacSourcery (800/622-7723, www.macsourcery.com) converts Director 7 files to screen savers.

—EDITED BY MICHAEL GOWAN

Ricoh's $2,395 AP204 prints at 600 dpi on letter-size pages.

includes an external EFI Fiery print server with built-in PostScript 3, networking, and color-management capabilities. Epson will offer the printer exclusively through Ikon Office Solutions (610/296-8000, www.ikon.com). The printer and Fiery server together will sell for just under $10,000.

publishing

Color Profiles for the Masses

NEW PROGRAMS MAKE IT EASIER TO CREATE YOUR OWN DEVICE PROFILES

by Stephen Beale

Software developers are seeking to demystify the arcane science of color management by introducing inexpensive products that make it easy to create your own color-device profiles. These profiles, designed for use with Apple ColorSync and other color-management systems, provide information about the color-reproduction characteristics of specific monitors, scanners, and printers.

Monaco Systems (978/749-9944, www.monacosys.com) has introduced MonacoEZcolor, a $299 profiling package that's also bundled with Epson's Expression 800 flatbed scanner as MonacoProfiler Lite. To create a scanner profile, you simply scan a standard IT8 target; the program analyzes the scanned color values and compares them with the known values in the target to determine the scanner's color characteristics.

Creating a printer profile is a little more complicated: you print a page from the program that includes a set of color swatches in the upper half, then you attach the same IT8 target to the bottom half and scan the page. You can profile monitors by adjusting a series of on-screen images; the program also accepts data from Monaco's $199 MonacoSensor, a hardware device that measures the actual colors that the monitor produces.

Color Solutions (760/436-6593, www.color.com) has introduced ColorBlind Prove-It, a monitor-profiling package for local area networks. In addition to creating monitor profiles, you can use the program to view the color characteristics of any monitor on the network. A software-only version will sell for less than $50; a version with a monitor sensor will set you back $299. Color Solutions also offers a $999 package called ColorBlind Matchbox that combines a colorimeter with color-profiling software for scanners, monitors, and printers.

ProfileEditor from Color Partnership (800/554-8688, www.colorpartnership.com) is a $245 program that lets you create profiles for printers and other output devices by visually comparing a printed sample image with one displayed on a calibrated monitor. You adjust the on-screen display to match the print, and the program generates a profile.

Hexachrome Help It's not a color-management product, but Pantone's (888/726-8663, www.pantone.com) new $129 HexVector plug-in for Adobe Illustrator makes it easier to match spot colors by giving Illustrator users access to the company's Hexachrome system. Macromedia FreeHand already offers built-in Hexachrome support.

In any print job there are two ways to specify a spot color: you can simulate it using CMYK process colors, or produce an extra plate for the spot-color ink. The former makes it difficult to get an exact color match, but the latter is typically more expensive and cumbersome. Pantone says that Hexachrome, which uses six process colors rather than the standard four, can accurately reproduce 95 percent of Pantone Matching System colors, compared with about 50 percent in CMYK.

Certification Setting up a reliable color-management system, especially in a high-volume production environment, can still be a challenge. The Graphic Arts Technical Foundation (800/910-4283, www.gatf.org), a nonprofit trade group, has teamed with Apple Computer to provide a certification program for color-management specialists.

To be certified, printing companies and service bureaus must pay a fee and pass a one-day audit in which they show proficiency in using a ColorSync-based color-management system. The foundation says certified companies will be well positioned to help customers by educating them about color management and providing customized device profiles.

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Reviews

Palm V

PALMTOP NOW MORE MAC-LIKE THAN EVER

SUZANNE ROADY

CONSIDER THE SIMILARITIES between the PalmPilot, the smash-hit pocket computer, and the Macintosh: both devices are based on a Motorola chip, they have nearly identical user interfaces, and both reflect an obsession with simplicity and intelligent design. Even the designers are the same—60 percent of Palm Computing's employees once worked at Apple. And yet for the first years of the PalmPilot's existence, its connections to the Mac were crude at best.

Almost overnight, everything has changed. With the release of 3Com/Palm Computing's long-awaited MacPac 2 (see the sidebar), at last we can heartily recommend the PalmPilot as a Macintosh peripheral. An explosion of third-party software conduits connects all kinds of Mac data—FileMaker, Microsoft Word and Excel, and Intuit Quicken documents, plus your calendar and address-book information—to the PalmPilot with the press of a button. And 3Com/Palm Computing has released a pair of new models: the Palm IIIx and the ultrachic Palm V, whose sleek, sculpted, heat-blasted aluminum case seems inspired by the same curvy coolness factor as Apple's own recent models.

Style Statement

The stunning-looking Palm V represents a pure hardware makeover—it's slightly shorter and narrower than previous models, and much thinner and lighter (0.4 inches thick, 3.8 ounces). This shrinkage makes it even likelier that you'll carry the Palm V with you.

The palmtop's superthin profile hints at the next big change: this is the first model not powered by AAA batteries. Instead, a LiIon battery drives it; the battery gets recharged whenever the Palm V sits in its new, AC-powered HotSync cradle. One charge lasts approximately a month, a complete drained-to-full charge takes 90 minutes, and just one HotSync (two-way update) a day is enough to keep the Palm V fully charged, according to the company. This new battery scheme is arguably better for both the environment and your battery budget. It also means that you can leave the Palm V turned on all day as it sits in its cradle, displaying your schedule, a clock, or even a family photo.

On the other hand, since the device now draws power through its sole connector—its HotSync jack—no existing add-ons fit the Palm V. All Palm peripherals must be redesigned, including the

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Delorme Tripmate (a GPS satellite receiver) and LandWare's GoType portable PalmPilot keyboard (the company has already announced a Palm V–compatible version). Nor will Palm's own snap-on Palm modem fit the Palm V; you'll have to buy the sleek new $170 Palm V clip-on modem. (A $50 travel kit, featuring a recharging cord that doesn't require the cradle, is also available.)

The Palm V's other dramatic new feature is its razor-sharp screen. Based on a new film technology from 3M, it provides a light yellow-green background for text and graphics, which seem to float on the glass's surface. (PalmPilot fans who clamor for a color screen should note the cautionary tale of the new color Windows CE palmtops, whose batteries die after only eight hours of use. Compare that with two months for the Palm IIIx and one month for the Palm V.) Unfortunately, both the Palm V and the Palm IIIx do something bizarre when you turn on the backlighting: rather than simply lighting up, Indiglo-like, as on previous models, the entire screen also inverts black and white. The effect is disconcerting and not necessarily more readable than the original scheme.

3Com has solved the contrast-knob problem at last. On the original PalmPilot models, it was all too easy to bump off this knob in your pocket; the Palm III recessed the knob so deeply it was almost inaccessible. On the Palm V, you press a physical button to summon an on-screen contrast slider—a great improvement.

The rest of the Palm V story involves low-key touches: there's now a stylus slot on both sides of the device, a nod to left-handed users. (The Palm V includes a leatherette screen cover; one edge slides into the unused stylus slot as a hinge.) And 3Com/Palm Computing sells a line of Palm V accessories, including a combination stylus–ink pen and a head-turning, brushed-aluminum hard case (this prevents accidental button-pressing in your pocket, which the leather flap often fails to prevent).

Less Flashy Sibling

Although the Palm V is remarkably beautiful, it also costs $80 more than its predecessor, the Palm III, and doesn't add features or memory. (On the other hand, the Palm V's 2MB go a long way; a typical Palm program is under 20K.) The less flashy but more practical buy is the Palm IIIx (●●●●½; $369 list price). This model is nearly identical to the Palm III but sports twice the memory, a screen almost as good as the Palm V's, an expansion slot, and a more rugged circuit-board design. (The budget-conscious should also note that the Palm IIIx pushes the previous model, the Palm III, down to well below $300 and the two-year-old PalmPilot models to less than $200.)

Neither new model introduces any software changes. Skeptics may grumble, but there's much to admire about a company that refuses to pile new features, Microsoft-like, on a machine popular for its speed, simplicity, and elegance. Furthermore, remember that the Palm III, IIIx, and V are flash-ROM upgradable—in other words, when 3Com does decide to update the software, you'll be able to do so by downloading a software updater to your Macintosh.

Macworld's Buying Advice

The Palm V is the StarTac phone or Mont Blanc pen of pocket electronics; the Palm IIIx is the rugged workhorse. Both new models represent careful, welcome improvements to one of the most beautifully conceived pieces of electronics since the Macintosh itself.—DAVID POGUE

RATING: ●●●●½ **PROS:** Gorgeous, slender case design; outstanding new screen technology; rechargeable batteries. **CONS:** Expensive; incompatible with existing add-ons **COMPANY:** 3Com/Palm Computing (800/881-7256, www.palm.com). **LIST PRICE:** $449.

MacPac 2

REBORN PIM SYNCS WITH PALMS

THE LONG-AWAITED PALM-compatible version of Claris Organizer, which 3Com acquired from Apple last year, is here at last. Like Organizer, 3Com/Palm Computing's MacPac 2 combines an easy-to-use scheduler and contact manager in one convenient package—but it can also share data with Palm organizers.

Full Calendar MacPac 2's multiday view shows banners and appointments on top, to-do's below.

You can access MacPac's datebook views from the tool bar or by clicking on tabs in the calendar window. Schedule items include timed appointments, banner events, and to-do's (although there's no place to describe events). The contact manager sports all the customary data-entry aids and supports popular formats for printing envelopes and labels. An optional Instant Desktop menu lists your favorite contacts' names and phone numbers, along with the current day's events and tasks.

MacPac is an excellent stand-alone PIM, but its real strength is its ability to share data with Palm organizers. On the plus side, 3Com has done an admirable job of writing fast, reliable conduits to handle the flow of data to and from the Palm hardware. But if you're expecting the desktop software to mirror the data on your organizer faithfully, you may be disappointed. For example, untimed events that repeat daily, weekly, or monthly don't transfer from the Palm to the desktop. Even more annoying, notes linked to calendar items on the Mac lose their attachments when you transfer them to the Palm.

Macworld's Buying Advice

MacPac 2 will probably satisfy most Palm users. But if you find the inconsistencies between the desktop and the palmtop frustrating, try Chronos's $50 Consultant (see *Reviews*, April 1999)—it syncs with Palm organizers and lets users share contact and schedule data.—FRANKLIN TESSLER

RATING: ●●●½ **PROS:** Syncs reliably with Palm devices. **CONS:** Desktop software doesn't always mirror data on Palm. **COMPANY:** 3Com/Palm Computing (800/881-7256, www.palm.com). **LIST PRICE:** Free for download; on CD, with adapter cable, $15.

form-Z 3.0

INDUSTRIAL-STRENGTH 3-D MODELING

AUTO-DES-SYS'S FORM-Z, WITH its strong feature set and range of geometry-creation capabilities, has long been the high-end modeling package to beat on the Macintosh. Version 3.0.2 expands form-Z's modeling prowess in both obvious and subtle ways, and it offers (at a price) an improved renderer that delivers a degree of realism not previously attainable without a separate rendering program. It's not designed to appeal to the 3-D novice, but the many enhancements will please advanced users.

A Better Modeling Model

form-Z's forte has always been 3-D modeling, and this revision brings a variety of enhancements to the drafting table. Unlike previous versions, form-Z 3.0 supports true NURBS (nonuniform rational B-spline) objects. In addition, the program now lets you mix and match editing modes regardless of how the objects were created—for example, you can easily convert a cylindrical shape created as a basic primitive into a NURBS or *patch* object (one that can be broken into nonuniform constituent chunks). Version 3.0 supports the full range of patch operations, including custom subdivisions and attaching and stitching patches. Spline handling has also been beefed up with B-splines and quadratic and cubic Bézier splines for creating complex shapes. These major improvements—combined with an already potent variety of modeling tools—solidify form-Z's position as the most capable 3-D modeling package for the Macintosh.

Some of the more subtle improvements in the modeling realm include support for skinning between sources that have different numbers of vertex points and the ability to preview the expanded alignment options—for example, you can select different alignment modes for a set of selected objects, and form-Z interactively displays the objects with the selected alignment settings. The new hierarchical layering and manipulation features are tremendously useful for editing and managing complex objects made up of many smaller parts.

Version 3.0's interface, although it still takes some effort to master, is more intuitive for the production-minded 3-D artist and a bit more approachable for new users. For example, it's more customizable; you can edit the core tool palettes to display only the items you use the most, and arrange tools in any combination. The new Options palette displays most of a selected object's vital statistics—a simple task that required bringing up a dialog box in previous versions—and lets you edit object parameters. Overall, this version seems more accessible than previous ones, even though learning the program still requires a substantial investment of time and effort.

Radiant RadioZity With the optional RadioZity rendering module, form-Z 3.0 can simulate real-world lighting conditions and produce exquisitely realistic scenes.

Pictures at an Exhibition

In the rendering arena, form-Z's improvements include new shaders for rendering snow, fog, and volumetric lighting—welcome additions for architectural applications. An optional module, RadioZity, offers strikingly realistic radiosity rendering (which simulates light energy in a scene, resulting in much more realistic shadow and color detail than ray tracing can offer). If you need ray-tracing capabilities, you have to purchase the RenderZone module.

It's also important to note that RadioZity, while delivering very high rendering quality, is simply not fast enough for even the most basic camera animation—for example, flying around a building that is illuminated by more than a couple of light sources would take an inordinate amount of time to render. This is not a limitation of form-Z or RadioZity's implementation of radiosity rendering; the complex calculations that radiosity requires are simply too much for anything more complicated than a still image frame.

Although objects and scenes are usually best exported to a separate animation program (such as Electric Image's ElectricImage), form-Z now offers basic tools for animating the camera in a scene. These tools allow you to create fly-throughs of 3-D scenarios and form-Z documents. Unfortunately, because you can't do anything more complex (such as moving the actual objects in a scene), you still need an external animation program for anything but the simplest tasks.

This requirement is a drawback for anyone seeking a one-stop solution for 3-D animation; on the other hand, form-Z's intended audience is clearly more interested in industrial-strength modeling than in advanced animation. But the relatively high price of the rendering options, combined with form-Z's limited animation controls, still force serious users to buy a separate rendering and animation program—not an attractive option for those on a budget.

Macworld's Buying Advice

form-Z remains the most powerful, flexible 3-D modeler for the Macintosh. Although better object animation would have been welcome, form-Z has never been billed as an animation package. The bottom line: if you can't model something in form-Z, chances are you can't model it on a Macintosh.—DAVID BIEDNY

RATING: ★★★★½ **PROS:** Useful additions to modeler; true NURBS support; customizable interface; enhanced scene-organization tools. **CONS:** Animation limited to camera movement; expensive rendering options. **COMPANY:** auto-des-sys (614/488-8838, www.formz.com). **LIST PRICE:** $1,495; with RenderZone, $1,995; with RadioZity and RenderZone, $2,390.

Accounting Software

NEW OPTIONS FOR SMALL-BUSINESS ACCOUNTING

THE PAST FEW YEARS HAVE SEEN significant changes in the Mac accounting-software landscape: Intuit stopped developing QuickBooks for the Mac, Peachtree Accounting resurfaced as Aatrix Accounting, and BestWare updated M.Y.O.B. Accounting Plus with time-billing support and links to Microsoft Office 98.

Both Aatrix Accounting 3.0 and M.Y.O.B. Accounting Plus 8.0 do a creditable job of shielding users from the mysteries of double-entry accounting while offering the essential components of a small-business accounting system. However, M.Y.O.B.'s additional features and better stability make it a smarter choice for most small businesses.

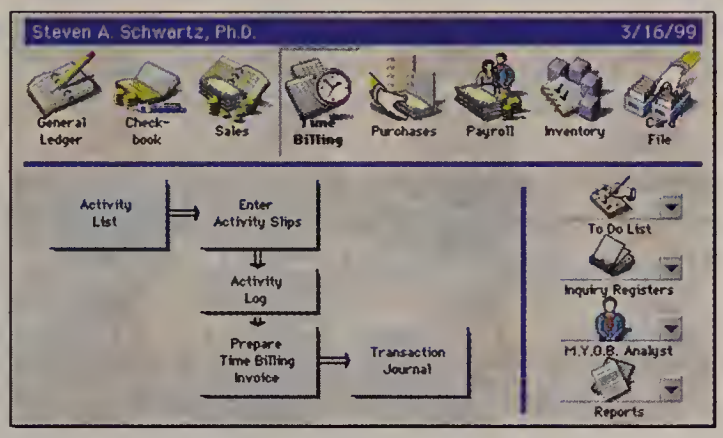
Getting Started

Both programs give you a sample company file to experiment with before committing your financial data. To speed the setup process, M.Y.O.B. uses wizards that help you select and modify a chart of accounts; enter vendor, customer, and employee contact information and historical data; choose a default invoice and purchase-order form; and customize the program's operation.

Aatrix Accounting also uses a wizard to collect basic information and create your chart of accounts, although you have fewer sample companies to choose from. As you enter your setup information, an on-screen checklist reminds you of the incomplete tasks. Unfortunately, I wasn't able to get check marks to appear for the completed sections.

Perhaps because Aatrix isn't as feature-rich as M.Y.O.B., it's easier to use for basic operations such as paying bills and recording receipts. You can quickly select an activity from the hierarchical pop-ups at the bottom of the screen; to enter a vendor code, customer code, or account identifier, you double-click on the field or click on the magnifying-glass icon. Ever-present Smart Guides display field-related help information. And while the online tutorial needs updating (it still refers to Peachtree Accounting), the Help file does contain an excellent introduction to double-entry accounting.

M.Y.O.B. has a more polished interface and a more professional-looking manual. You select operations from a graphic, hierarchical interface similar to Aatrix Accounting's (see "Selecting Activities").



Selecting Activities To select activities in M.Y.O.B. Accounting Plus 8.0, you click on buttons in the hierarchical interface; drop-down menus list reports and other advanced features.

However, many seemingly simple operations force you to search through the manual and the myriad of help systems; I frequently found myself looking in the wrong sections of the program for previously entered data. Even the method of displaying code lists takes getting used to. For example, to view a list of vendor or account codes, you must tab out of the field.

M.Y.O.B.'s new support for time-billing accounting will make it attractive to service-oriented businesses. You define activities that are billed according to an employee's hourly rate, a customer-specific rate, or an activity rate. And you track work in progress with activity slips; times can be filled in by hand or by clicking on the slip's timer button.

Reports, Forms, and Security

Both programs offer many standard reports, along with customizable forms, that you can view on screen or print. Here, M.Y.O.B. is clearly superior. You can easily change the order of the fields, which fields appear in a report, and the fields' formatting. You can customize forms by dragging or resizing fields and pasting graphics from the Clipboard. Version 8 can also export data to Microsoft Office 98—a feature previously available only to Windows users.

Aatrix Accounting's approach to customizing reports and forms, on the other hand, is reminiscent of DOS accounting programs. Few users will have the patience to do more than add a logo to their forms.

M.Y.O.B. is designed for multiple users; you just buy a license for each workstation you want to add. Although you can run Aatrix Accounting in a multiuser environment, the company says it's too slow to be used that way. In either program, you can set passwords that allow access to the entire package or only to certain functions or modules.

Each program has a backup command to safeguard your data files. Unfortunately, Aatrix's backup procedure repeatedly crashed our test machine, even after a clean install of OS 8.1; backups had to be restored manually. (The company is aware of the problem and says it affects only users of certain versions of the OS prior to 8.5.)

Macworld's Buying Advice

Of the two programs, M.Y.O.B. Accounting Plus 8.0 is clearly the more polished, evolved, and feature rich; Aatrix Accounting 3.0, although easy to learn and use, has stability problems and lacks time-billing and multiuser features. Regardless of which program you choose, nonaccountants should expect to seek professional assistance when getting started and plan on a relatively long learning period.—STEVEN SCHWARTZ

Aatrix Accounting 3.0

RATING: ♦♦½ **PROS:** Choosing modules and entering data is easy. **CONS:** Complicated report writer and forms customization; frequent crashes; doesn't support multiple users. **COMPANY:** Aatrix Software (800/426-0854, www.aatrix.com). **LIST PRICE:** $169.

M.Y.O.B. Accounting Plus 8.0

RATING: ♦♦♦♦ **PROS:** Excellent setup routine; time-billing support; links to Microsoft Office, multiuser ready. **CONS:** Difficult to learn; confusing help system. **COMPANY:** BestWare (800/322-6962, www.bestware.com). **LIST PRICE:** $199, plus $99 per workstation license.

Epson Stylus Color 900

INK-JET PRINTER BREAKS THE SPEED BARRIER

BACK IN APPLE'S DARKEST DAYS, Epson was the only major manufacturer of ink-jet printers for the Mac. Now that Apple is healthy again, Hewlett-Packard and Canon are moving into Epson's territory with new Mac-based ink-jet models. But Epson isn't resting on its Mac laurels; the company's new $449 Stylus Color 900 offers unprecedented speed and print quality with an added bonus—it works with older Macs that have serial ports, in addition to the new USB-equipped Power Mac G3 systems.

Speed Demon

Two features distinguish the Stylus Color 900 from its predecessor, the Stylus Color 850: speed and image quality. Epson says the Stylus Color 900 is its fastest ink-jet printer; Macworld Lab tests show that while it doesn't quite match the rated 10-ppm print speed, it's a speed demon at lower resolutions.

We produced a variety of sample prints on both plain and photo-quality paper, at 180 by 180 dpi, 360 by 360 dpi, and 720 by 1,440 dpi. One unusual aspect of the printer is that its speed is nearly identical at 180 dpi and 360 dpi: an 18MB Adobe Photoshop image took 50 seconds to print at the lower resolution and 55 seconds at the higher setting. When we switched to the 360-dpi fine mode—which offers better image quality—the same file printed in about 75 seconds.

We saw similar results when printing a seven-page QuarkXPress document: it took 98 seconds to print at 360 dpi in normal mode and nearly 4 minutes at 360 dpi in fine mode. However, the printer slows considerably at its maximum resolution of 1,440 by 760 dpi: the Photoshop file printed in about 10.5 minutes, while the QuarkXPress document took nearly an hour.

Variable Dots

Epson has boosted the printer's image quality by reducing the minimum ink-drop size to 3 picoliters, compared with 11 picoliters in the Stylus Color 850 and 6 in the more recent Stylus Color 740 (see *Reviews*, January 1999). The smaller drop size allows the Stylus Color 900 to generate variable-size dots for sharper edges and enhanced photo quality.

Although it's a four-color printer, the Stylus Color 900 produces photographic images whose quality appears to equal or exceed that of images printed on the six-color Stylus Photo 700. Even printed at 360 dpi on plain paper, images looked very good. Printed at full resolution on photo-quality glossy paper, the images were spectacular (although one sample photo in our test suite appeared a bit dark when we used the default settings). Text, line art, and photos all showed sharp edge detail, and text printed on plain paper was virtually indistinguishable from laser-printer output.

GIBSON

Thanks to the smaller drop size in the Stylus Color 900, you'll see the biggest difference in photos with lots of fine detail. With softer images, you won't see as much difference between the Stylus Color 900 and the Stylus Color 740 (which also uses variable-dot printing).

The printer uses two ink cartridges, one for black ($33) and the other for cyan, magenta, and yellow ($40). Epson says the black cartridge is good for 840 pages—assuming 5 percent coverage at 360 dpi—while the color cartridge produces 570 pages at the same resolution. This works out to less than 4 cents per page for black and about 7 cents for color—quite reasonable for an ink-jet printer. However, with a three-color cartridge, you have to replace the entire unit if even one color runs out.

Flexible Bundle

Epson ships the printer with its standard driver software, which includes tools for adjusting output and checking the printer's operating status. You can reposition output on the page; bump cyan, magenta, and yellow channels up or down using a curves function; and check the ink level in each cartridge. The driver automatically adjusts output to match the media type you've selected; you can also choose from Apple's ColorSync or Epson's built-in color-management software. Although the Stylus Color 900 produces CMYK output, you get the best results when generating RGB images, which the printer converts to CMYK as it prints the pages.

The Stylus Color 900 has no built-in network connections, although you can use the serial or USB ports to add it to an AppleTalk network. A $649 networked version with a built-in 10/100BaseTX card should be available by the time you read this. You can also add an Ethernet card to the base model.

Epson is offering an unusual software bundle in which you can choose any two Mac programs from a list of five: Dr. Solomon's Virex, Lotus Organizer 97 GS, Sierra's Print Artist 4.0, Berkeley Systems' You Don't Know Jack Volume 1, and Blizzard Entertainment's Warcraft II: Tides of Darkness.

Macworld's Buying Advice

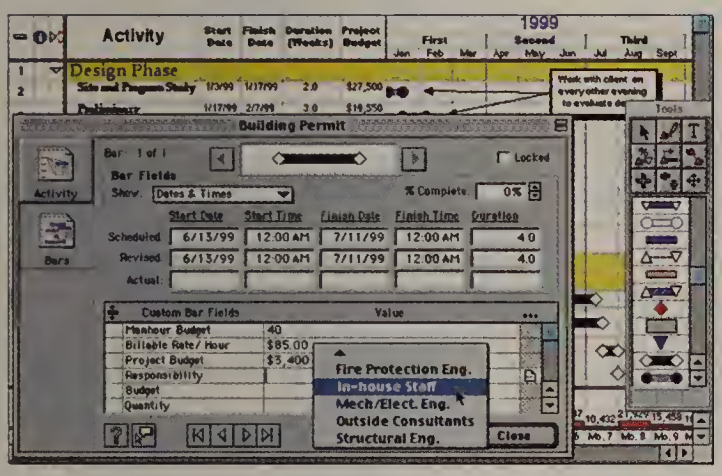
The Stylus Color 900 continues Epson's tradition of bringing groundbreaking ink-jet printing technologies to the Mac market. Its high speed and relatively inexpensive consumables make it a viable alternative to costlier color lasers for general business applications. However, it's pricey for an ink-jet printer, and you lose almost all of the speed benefits when printing at full resolution. If you're willing to compromise a little on speed and photo quality, consider the Stylus Color 740, which costs about $170 less.—STEPHEN BEALE

RATING: ♦♦♦♦ **PROS:** Fast; excellent print quality. **CONS:** A bit pricey for an ink-jet printer; much slower at high resolutions. **COMPANY:** Epson America (800/463-7766, www.epson.com). **COMPANY'S ESTIMATED PRICE:** $449.

Job-Management Software

KEEP PROJECTS ON TRACK WITH FASTTRACK SCHEDULE, JOB MANAGER, AND JOBORDER

SERVICE BUSINESSES WITH 10 to 200 employees face unusual challenges in automating their billing and job-tracking processes. The three packages covered here—AEC Software's FastTrack Schedule 6.01, Management Software's JobOrder 7.02, and MetaCommunications' Job Manager 1.5—offer productive job-management functions without the cost and complexity of high-end vertical systems.



Visual Timeline FastTrack Schedule makes it easy to display a job's progress.

JobOrder 7.02, based on the ACI US 4th Dimension database, will appeal to ad agencies, design shops, consultants, and engineering firms. It handles job planning and estimating, scheduling, proposal creation, inventory management, and accounting. The software requires much attention to detail and takes some time to learn. Setting up JobOrder takes from a few hours to several days; you enter everything from sales-tax rates and work-center names to general-ledger account numbers.

Activities revolve around a job, which you initiate by creating a proposal specifying the time and material resources required. Using one of many forms, you select general work categories and enter the duration of each phase. Once a client approves your proposal and the job begins, each person records his or her daily activities using time slips. This data automatically flows to the accounting area, yielding up-to-the-moment invoices and financial listings.

JobOrder offers valuable management tools. For example, a timeline, automatically created when you turn an estimate into a job, shows underused or overbooked resources. The program also generates extensive printed forms and reports.

Creative Order Management

Job Manager 1.5 is similar to JobOrder in a variety of ways. It tracks jobs from initial order entry through invoicing; employees record time and material data, and the program can generate management reports at any time. However, Job Manager lacks JobOrder's formal estimating step, and you need a third-party application for detailed accounting. The back-end database is Microsoft SQL Server, requiring Windows NT.

Appropriate for commercial printers, publishers, and design shops, Job Manager has much going for it. The program is reliable and easy to customize, and it usually works more quickly than JobOrder. Creating a new job requires only a job number, name, and customer; forms are prefilled based on a user's log-in.

So how do you maintain discipline and consistency? Electronic job tickets track employee time, and workflow templates graphically show how each job should run through your production cycle. As a result, managers can determine just when a job entered and left each cost center and who worked on it. Version 1.5 adds the ability to track outside purchases, and gives you the option of including sales and service representatives in the workflow.

Scheduling without the Overkill

Traditional project-management software demands that users understand a lot of theory. FastTrack Schedule 6.01 produces colorful timelines without requiring knowledge of resource loading or PERT charts. Version 6.01 further simplifies scheduling by automatically linking tasks; exchanging schedules with Microsoft Project; and supporting Mac OS 8.5 features, such as folder actions.

To build a schedule, you simply position an activity bar in the timeline graph; start and finish times automatically register in the corresponding data columns. After you enter more tasks, the built-in outliner lets you arrange them in unlimited outline levels.

FastTrack Schedule doesn't recognize resources, such as people and material, but its core scheduling is quite good, and it is far easier to use than full-fledged project managers.

Macworld's Buying Advice

JobOrder is more involved and costs more per client than does Job Manager, but the former accommodates a wider range of businesses and includes accounting functions. Still, design firms and other creative businesses will find few drawbacks in Job Manager, so you should consider it first. If you simply need to keep more-accurate timetables, we recommend FastTrack Schedule.—MIKE HECK

FastTrack Schedule 6.01

RATING: ♦♦♦♦ **PROS:** Automatic task linking, scripting, filtering, and activity outlining; fine presentation tools. **CONS:** No resource management. **COMPANY:** AEC Software (800/346-9413, www.aecsoft.com). **LIST PRICE:** $199.

Job Manager 1.5

RATING: ♦♦♦♦ **PROS:** Extensive job tracking and costing; straightforward navigation. **CONS:** Requires Windows NT server; no basic accounting. **COMPANY:** MetaCommunications (800/771-6382, www.jobmanager.com). **LIST PRICE:** Five users, $3,699.

JobOrder 7.02

RATING: ♦♦♦½ **PROS:** Customizable quotes and bids; timelines; double-entry accounting. **CONS:** Takes time to set up and learn; costly. **COMPANY:** Management Software (607/756-4150, www.joborder.com). **LIST PRICE:** Five users, $7,840; setup and training, $250.

Epson Expression 800

MIDRANGE SCANNING AT A LOW-END PRICE

SUZANNE ROADY

SCANNERS KEEP GETTING BETter and less expensive, but even within this competitive landscape, Epson's Expression 800 is a breakthrough in price and performance. When equipped with an optional transparency adapter, it's the first under-$1,000 flatbed that we'd consider when scanning 35mm slides for anything other than the Web.

The scanner is available in three configurations. The $699 Executive includes Epson TWAIN Pro and LaserSoft SilverFast Lite scanning modules, Adobe Photoshop 5 LE, NewSoft Presto Page Manager, and Xerox TextBridge Classic OCR software. The $799 Artist model adds the full LaserSoft SilverFast 4 and Monaco Profiler Lite. But the real breakthrough comes in the $999 Pro package, which adds a transparency adapter to the Artist bundle, transforming the Expression 800 into a slide scanner.

The Expression 800 uses a quarter-stepping motor to move the scanner head in 3,200-dpi increments, producing a true optical resolution of 800 by 3,200 dpi. We've generally been skeptical about interpolated resolution in scanners, but at 2,400 by 2,400 dpi we found that the flatbed gives excellent results from 35mm slides. The dynamic range, quoted at 3.3, is adequate for most transparencies, although high-contrast slides may exhibit blocked or noisy shadows. The scanner is also fast and quiet, and it offers switchable SCSI termination.

LaserSoft's SilverFast 4.0 is a powerful scanner driver that functions as a standalone application or as a Photoshop plug-in. It's ColorSync-savvy, offers a full range of control, and allows you to scan directly to CMYK, RGB, or gray scale. The AutoPilot feature allows relative novices to produce good scans right off the bat, but achieving total mastery over SilverFast entails a fairly steep learning curve.

The software's Unsharp Masking filter works well—an important point because too much sharpening can create aliasing effects that reveal the horizontal interpolation. On the downside, it takes a lot of work to get good scans from color negatives.

Monaco Profiler Lite does a great job of creating profiles for the scanner and inkjet printers. Rather than forcing you to measure color patches with an expensive spectrophotometer or colorimeter, it uses the scanner to measure printed output.

Macworld's Buying Advice The Executive bundle is a good deal, but if you're happy with its functionality, you're also likely to be happy with a less expensive scanner. The Artist bundle is also a good deal, but the Pro version is the real breakthrough, letting you scan everything from 35mm film to 8-by-10-inch reflective originals for about $1,000.—BRUCE FRASER

RATING: ♦♦♦♦ **PROS:** Fast; handles a wide range of originals; strong software bundles. **CONS:** Color negatives are challenging. **COMPANY:** Epson America (800/463-7766, www.epson.com). **LIST PRICE:** Executive model, $699; Artist, $799; Pro, $999.

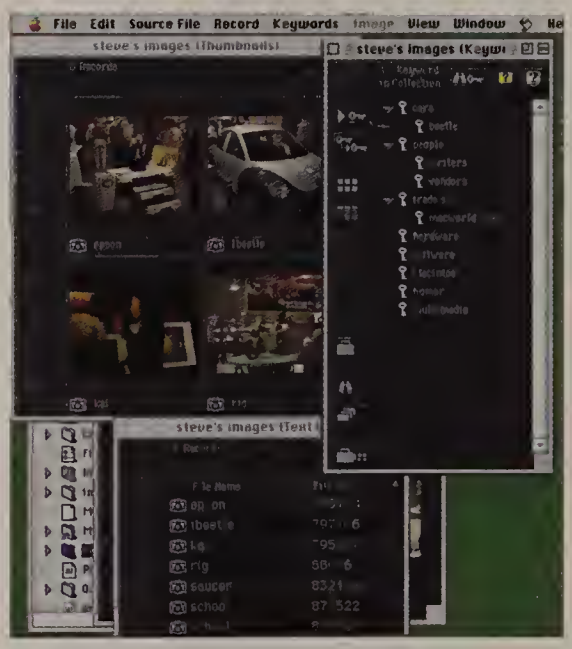
ImageAXS Pro 4.0

MIDRANGE IMAGE DATABASE

WHETHER YOU CALL THEM image databases or media-asset managers, programs that help you organize photos, illustrations, movies, sounds, and other elements are the current rage among media pros. ImageAXS Pro 4.0 occupies a middle ground among these programs, lacking networking capabilities but otherwise offering a full range of media-organizing tools, including the ability to automate operations through AppleScript.

In ImageAXS, creating an image database is easy: you can open image files from within the program or drag and drop folders from the Finder. You can then view the images as individual records, in a thumbnail window or in a Finder-like text list. Within each collection, images are organized into portfolios.

You can quickly tag a group of images using keywords; once you define a keyword, you can drag it to any records you choose. You can also create keyword hierarchies. In addition to assigning keywords, you can define an unlimited number of text fields for each collection.



Too Many Windows ImageAXS Pro 4.0 is flexible, but the interface tends to get a bit cluttered.

ImageAXS's scripting functions are also impressive. You can script most operations with AppleScript and use the program's recording mode to automate repetitive functions. An HTML Export function lets you quickly create Web pages containing thumbnail images; clicking on a thumbnail in a browser brings up the full image. You can also export selected images as self-launching slide shows.

Unfortunately, the program's multiple windows tend to clutter the interface. When viewing a single collection, you're likely to open the Text List window for fast sorting, the Thumbnail window to see the images, the Keyword window to assign keywords, and the Portfolio list to show all portfolios within that collection. If you perform a keyword search, any images you find appear in a temporary Portfolio window. It would be nice if the program took a more streamlined approach.

ImageAXS Pro supports most popular graphics and multimedia formats, including PICT, TIFF, JPEG, GIF, and all QuickTime 3 media types. However, it can display EPS files only if they include screen previews, and its support for native formats is limited to Adobe Photoshop.

Macworld's Buying Advice ImageAXS Pro 4.0 gives you flexibility when you're setting up collections and makes it easy to apply keywords to multiple image records. If you need a full-featured image database and can live without the networking functions, give it a look.—STEPHEN BEALE

RATING: ♦♦♦½ **PROS:** Flexible, scriptable image database; easy-to-use keyword function. **CONS:** No networking capabilities; cluttered design. **COMPANY:** Digital Arts & Sciences (800/449-6220, www.dascorp.com). **LIST PRICE:** $299.

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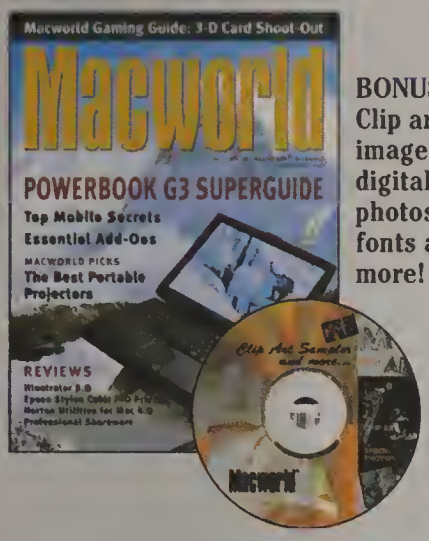

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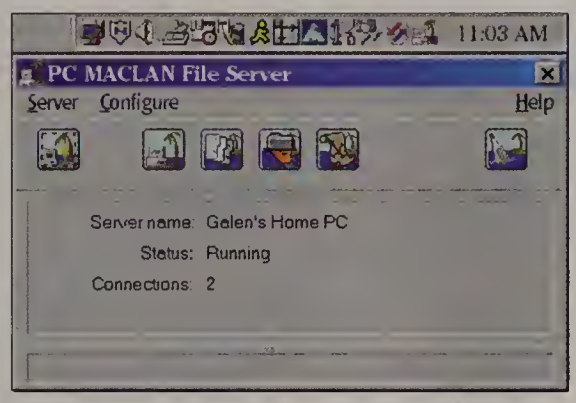
PC MacLAN 7.2 for Windows 95/98

PC CONNECTIVITY MUST-HAVE ADDS AWKWARD ARA SUPPORT

ABOUT A YEAR AGO, WE CHIDED Miramar Systems for offering Apple Remote Access (ARA) dial-up connectivity from PCs to Macs as a $179 companion product to the $199 PC MacLAN (see "Mac Life Preservers," April 1998). Happily, the companion product (PC MacLAN Remote) is no more; the new PC MacLAN 7.2 for Windows 95/98 now includes ARA support. But PC MacLAN Remote's biggest flaw remains in the new PC MacLAN: you must reboot your PC every time you switch between a dial-up ARA connection and a regular AppleTalk LAN connection.

Still, PC MacLAN is a wonderful tool that makes it amazingly easy to connect PCs and Macs. Once installed on your PC, it offers nearly invisible access to a PC from a Mac and vice versa. (Nothing needs to be installed on the Mac side.) From a Mac's perspective, the PC is simply another networked system available from the Chooser or Network Browser; from a PC's perspective, a Mac is simply another system in the Network Neighborhood.

In addition to supporting ARA, version 7.2 supports a handy new connectivity route: local and Internet networks based on AppleShare IP 5.0 and later. As Apple migrates from AppleTalk to TCP/IP, such connections will become more common. If your Mac servers are running AppleShare IP 6.0, however, they already support PC clients; you don't need PC MacLAN to let your PCs connect to them.



Easy Access PC MacLAN 7.2 for Windows 95/98 adds icons to the system tray, offering fast access to the program's file- and print-server controls.

Another welcome improvement is that network response time is noticeably faster. And PC MacLAN 7.2 adds two icons to the Windows system tray to give you double-click access to the file- and print-server software (which makes PCs and their printers visible to Macs).

There's still room for improvement in the program's manual, however. Rather than devoting a chapter to each key issue, the manual simply describes menu items and installation steps. This is a real flaw when you consider that networking software involves such complex issues as how to switch from ARA connections to networked AppleTalk, whether to enable TCP/IP for ARA connections on the client *and* server sides, and how to download fonts to a printer via the PC. The manual treats these topics skimpily and disjointedly.

Macworld's Buying Advice In spite of some lingering shortcomings, PC MacLAN 7.2 for Windows 95/98 is an essential product that does its job very well. It remains the easiest way for users and system administrators to connect Macs and PCs.—GALEN GRUMAN

RATING: 4½ **PROS:** Faster LAN connections; adds ARA and AppleShare IP protocols. **CONS:** Must restart PC to switch between ARA and LAN connections; abysmal documentation. **COMPANY:** Miramar Systems (800/862-2526, www.miramarsys.com). **LIST PRICE:** $199.

Olympus P-330

VERSATILE SNAPSHOT PRINTER

USING THE SAME DYE-SUBLIMATION technology that's in the Olympus P-300 (see *Reviews*, August 1998), the company's new P-330 Digital Home Photo Printer can produce great-looking 4-by-5-inch photos (3.8-by-4.5-inch image size) from a computer, an Olympus digital camera, a SmartMedia card, or a video device such as a camcorder or VCR.

When connected to your Macintosh, the P-330 prints photos at 153 dpi (at a resolution of up to 688 by 512 pixels) or 306 dpi (up to 1,376 by 1,024 pixels). Slider controls let you adjust the color balance while previewing the image, but otherwise the driver options are limited.

A parallel port connects the P-330 to a PC or an Olympus D-500L, D-600L, or D-620L digital camera. When connecting to any of the latter, you can use the camera's menu system to produce a single image, a 16-up print, or an index print showing every shot in the camera. Although this is a convenient way to print your images, the parallel connection is slow. Fortunately, the P-330 includes a built-in reader for SmartMedia cards, the storage media for digital cameras from Olympus, Fuji, and other vendors. Just pop the card into the P-330 and pick the image you want to print; the photo rolls out in about two minutes.

Actually, it's not *quite* that simple. To use SmartMedia, you connect the printer to a video monitor or a TV with a composite-video input and then insert the card. When the images appear on screen, you select and print them using hardware controls. You can print a full-size photo or single or multiple images in a 4-, 9-, or 16-up layout. (When connecting to a VCR or camcorder, you can capture a single video frame or multiple frames at 2.5-second intervals.) A Trim option lets you select a portion of the image to print, though you're limited to two selection sizes (resulting in 1.5× and 2× enlargement). You're also limited to 16 fixed positions for the cropping window, restricting your ability to frame the image precisely.

The P-330 can produce images that approach the quality of traditional photos, but when you're printing without a computer, you're at the mercy of your camera. If you begin with a poorly shot image, there's little you can do to improve it.

Olympus sells paper and ribbon for the printer in $40 packs, good for 60 prints. Installing the ribbon cartridge is a snap: you just open a door and slide it in.

SUZANNE ROADY

Macworld's Buying Advice The Olympus P-330 is a great complement to digital cameras that use SmartMedia. The $449 price tag may seem high for a consumer printer, but it's a bargain compared with other dye-sublimation printers. If you want digital photos that are nearly indistinguishable from traditional photo prints, it's hard to go wrong with the P-330.—STEPHEN BEALE

RATING: 4 **PROS:** Versatile; excellent image quality. **CONS:** Limited options when not printing from a computer. **COMPANY:** Olympus America (800/347-4027, www.olympus.com). **LIST PRICE:** $449.

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PhotoScripter

PHOTOSHOP PLUG-IN ADDS SCRIPTABILITY

THE PROFESSIONAL PUBLISHING industry relies almost entirely on two programs: QuarkXPress and Adobe Photoshop. While we've long been able to automate mundane and repetitive tasks in QuarkXPress using AppleScript, the ability to script Photoshop has remained elusive—until now. Main Event Software's PhotoScripter 1.0 adds a robust scripting vocabulary to Photoshop 5, letting you control almost every aspect of this powerful program using simple text commands.

PhotoScripter is unique in that it offers no user interface: you simply install it by dragging it into Photoshop's Plug-ins folder and launching the program, and Photoshop is instantly scriptable. To take advantage of this new scriptability, you write AppleScripts in a program such as Script Editor (which comes with the Mac OS) or the more powerful Scripter from Main Event (see *Reviews*, April 1997).

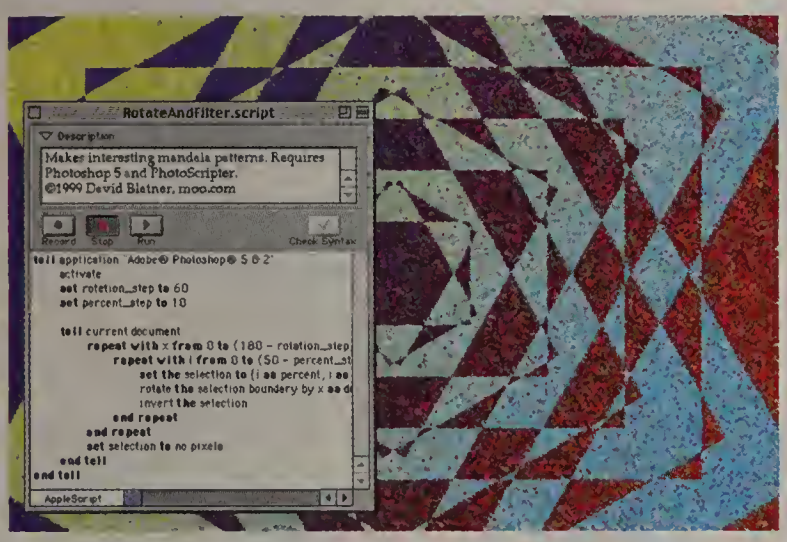
To understand what this plug-in really does, try opening Photoshop's AppleScript dictionary using one of these script-editing programs. Without PhotoScripter, the dictionary lists only one operation—**do script**, which simply runs an action you've created in Photoshop. With PhotoScripter, you can script everything, from making and transforming selections, to applying filters, to creating layers and editing their pixels.

But while the folks at Main Event really understand AppleScripting—and AppleScripters, whose success depends on how easily they can manipulate an application—they're not die-hard Photoshop users. For example, although PhotoScripter lets you define or adjust every point and control handle on a Bézier path and control each setting in the Calculations dialog box, it won't let you script common tasks such as copying a layer from one document to another.

Even though PhotoScripter doesn't run scripts blindingly fast (this is probably a limitation of Photoshop itself), it can usually execute a series of events faster than a mere mortal could. And because AppleScript lets you perform repeating loops, mathematical calculations, and conditional branching, you can create incredible images that would be too tedious even to consider doing by hand (see "Repetitive Motion"). Unfortunately, PhotoScripter doesn't make Photoshop "recordable"—it won't let you build scripts by stepping through the actions in the program.

Many of PhotoScripter's limitations stem from the fact that Adobe has, not surprisingly, kept some pieces of its program off limits to plug-in developers. For example, you can't control the settings in the Print and Page Setup dialog boxes, or query Photoshop to determine your image's properties.

Fortunately, the documentation is relatively good; the introduction to AppleScripting and the fundamentals of scripting Photoshop is excellent. But because the manual lacks an index, you have to paw through it until you find what you need.



Repetitive Motion PhotoScripter made it easy to create this image, which involved rotating and scaling a selection and applying Invert.

Macworld's Buying Advice

PhotoScripter 1.0 lets you build scripts as powerful as Photoshop itself. If you're a professional scripter, it would be a valuable addition to your arsenal.—DAVID BLATNER

RATING: ♦♦♦½ **PROS:** Excellent AppleScript vocabulary and dictionary; good manual. **CONS:** Can't control all Photoshop features; minor bugs; can't record actions. **COMPANY:** Main Event Software (800/616-8320, www.mainevent.com). **LIST PRICE:** Single-user version, $299; server-based production version, $999.

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VectorWorks

REWORKING A CAD CLASSIC

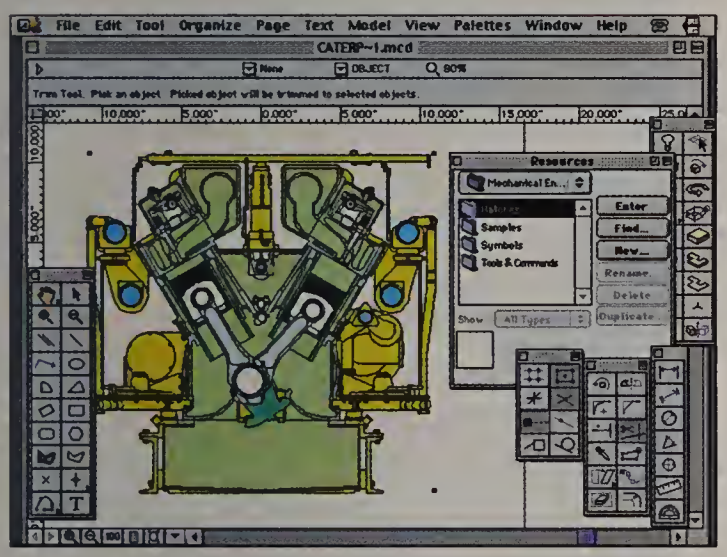
THE LAST RELEASE OF DIEHL Graphsoft's MiniCAD was version 7, but the latest release isn't called MiniCAD 8. With enough new content to merit a bump to version 10, the program has been reincarnated as VectorWorks 1.0—and there's nothing "mini" about its scope. Redesigned as a collection of modular objects rather than a single, monolithic block, this excellent program can tackle everything from architecture to theatrical lighting, with very modest hardware demands.

Updating the MiniCAD environment for the Web-aware, workgroup-oriented world of VectorWorks called for some big changes and a host of smaller tweaks. A major structural change is a redesign to accommodate plug-ins for special CAD functions. For example, although rendering—specifically, photo-realistic rendering with advanced lighting and display options—is crucial to presenting architectural designs to clients, it doesn't do much in HVAC or mechanical-parts design except take up disk space. Those who need it can add Diehl Graphsoft's $299 RenderWorks, a separate plug-in that functions inside VectorWorks.

Another important change is the addition of workgroup CAD, with a reference- or target-document–handling scheme that benefits from Diehl's observation of what *didn't* work smoothly in other CAD products' first-generation workgroup implementations. Unlike the latest versions of most other professional CAD programs, which want 96MB of RAM and the latest G3, VectorWorks—thanks to its careful modular design—fits into a mere 24MB of RAM and about 60MB of hard-disk space, with full libraries for everything from electronic design to landscaping. And the program is delightfully quick, even on older Macs. If you're stuck trying to do real CAD on a laptop, VectorWorks' humble demands make it your best bet.

Other improvements enhance VectorWorks' ease of use. For example, the Resource palette—a convenient window that holds frequently used objects—now has a Replicate button, so you can quickly generate and edit a family of similar objects (see "Pumpin'"). The program handles multiple undo's and redo's, and the new plug-in architecture lets you add curved walls, assorted building elements, and basic solid forms. A greater selection of graphic input and output formats, including JPEG and Windows BMP, makes life simpler in cross-platform environments, and DXG/DWF file translation has been updated for version 14 of these AutoDesk formats.

But several dozen menu-item and feature-name changes scattered throughout the program can cause annoying moments of head-scratching for longtime MiniCAD users. Some features simply have new names; for example, MiniPascal—an unhip name these days—reappears here as VectorScript, with unaltered Pascal syntax.



Pumpin' VectorWorks excels at the quick construction of complex drawings, combining giant component libraries with scripting and convenient palettes.

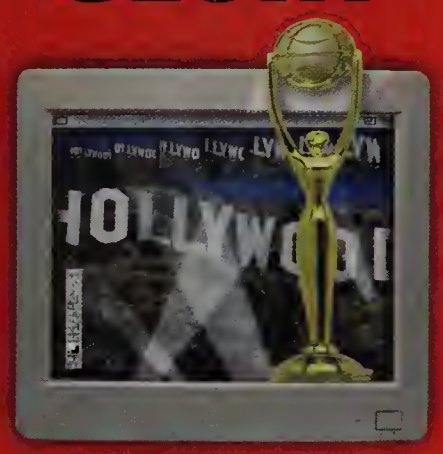
Macworld's Buying Advice

Comparable to industry heavyweights (such as Bentley Systems' MicroStation) costing up to $4,000, the $795 VectorWorks is fast, compact, and the best value in professional CAD software for the Macintosh.—CHARLES SEITER

RATING: ♦♦♦♦ **PROS:** Libraries and tools for every CAD purpose; modest hardware demands. **CONS:** Requires some reorientation effort for MiniCAD users. **COMPANY:** Diehl Graphsoft (888/646-4223, www.diehlgraphsoft.com). **LIST PRICE:** $795 (direct price, $595; upgrade from MiniCAD, $195).

GUTS

GLORY



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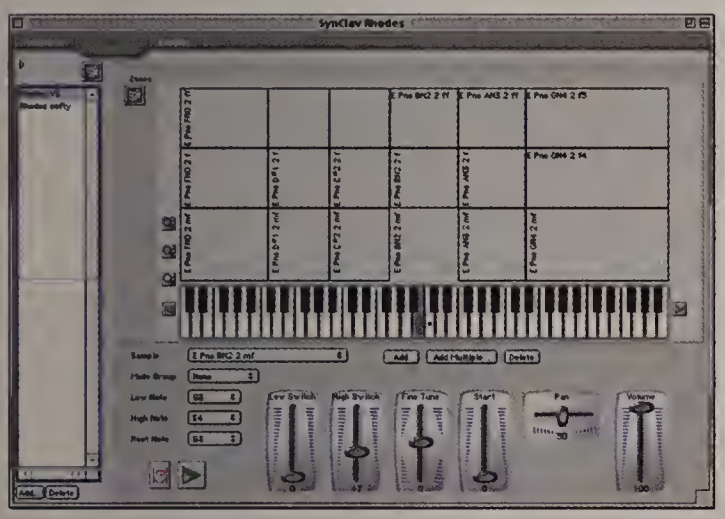
Unity DS-1

AUDIO SAMPLER IN SOFTWARE FORM

THE LINE BETWEEN COMPUTER and musical instrument is getting less distinct by the minute. Thanks to the increasingly powerful processors in today's computers—and the talents of a few software engineers—modern Macs can be transformed into musical machines. One such transformation is possible with the help of BitHeadz's Unity DS-1, a software-based digital sampler that—when given a fast CPU and heaps of RAM—is responsive enough to be used in live performances.



Mighty Multisample You can drag and drop SampleCell instruments directly into Unity DS-1's Multisample window.

Unlike analog synthesizers, which generate sounds with oscillators, samplers use recorded sounds as their building blocks. For example, the A-flat played by a trumpet can be recorded, digitized, loaded into a sampler's memory, and triggered by a MIDI keyboard. Most samplers can also alter the characteristics of a sound—change its attack, pitch, and harmonic makeup, for example.

Unity DS-1 is a remarkably complete sampling synthesizer that can do all this and more. But perhaps most noteworthy—for a software synthesizer, at least—is that when the program's various memory settings are configured properly on a fast Mac, Unity DS-1 plays with no noticeable delay. In addition, given enough memory and CPU horsepower, the sampler allows you to play up to 64 notes concurrently.

You can directly import Akai S1000, DLS, SoundFont 2.0, and SampleCell I and II instruments, with key and velocity maps intact. Just select an instrument file from a CD-ROM with SampleCell instruments, for example, and import or drag and drop it into Unity DS-1's Multisample page. In moments, the various samples that make up the instrument are mapped to the proper keys. You can also import single samples in Sound Designer I and II, AIFF, CD-Audio, and WAV formats.

Multisamples are assigned to one of two oscillators that act as your sound source. You can apply filters, modulation, and effects to these oscillators and then save these configurations as a program. You can layer or split two programs in Unity DS-1's MIDI Processor application.

But Unity DS-1 wants a *lot* of RAM—heed BitHeadz's recommendation that your Mac have 64MB or more. And although a 120MHz PowerPC is required, consider it a bare minimum. The program can squeak by with these configurations but is happiest on a fast 604e- or G3-based Mac.

Although Unity DS-1 comes with a passel of sounds, some of them are nothing to write home about. For example, those who have the RAM to spare will wish that BitHeadz had included a larger General MIDI bank—something BitHeadz claims to be developing as this issue goes to press. Also, now that BitHeadz has capably conquered the difficult problem of making a responsive software sampler, it should turn its attention to the program's interface. Many of Unity DS-1's elements are separate programs that would benefit from being ganged together into one or two applications.

Macworld's Buying Advice

Despite its cosmetic shortcomings, Unity DS-1 is a distinctive and flexible piece of software. If you're a musician with a fast, RAM-laden Mac who seeks an inexpensive alternative to hardware samplers—or you simply want to enhance your current MIDI setup with another instrument that can use your sample library—Unity DS-1 is well worth a listen.—CHRISTOPHER BREEN

RATING: ♦♦♦♦ **PROS:** Very responsive; compatible with most sample libraries. **CONS:** Included sounds are a little weak; interface needs work. **COMPANY:** BitHeadz (888/870-0070, www.bitheadz.com). **LIST PRICE:** $450.

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electron24

24-INCH MONITOR'S WIDE ASPECT RATIO HAS PROS AND CONS

ARNOLD TIOSEJO

HOW MUCH IS A BIGGER MACINtosh desktop worth to you? Whereas a 21-inch monitor can display two pages side by side, LaCie's 24-inch electron24, with a maximum resolution of 1,920 by 1,200 pixels, gives you enough added room to open a column of palettes next to that spread (the viewable area is 22.5 inches). But you'd better need those extra pixels, because at any other resolution you're getting what amounts to a 21-inch monitor with a wide frame on each side.

When you hoist this 90-pound beast out of its packing crate, you'll immediately notice the wide aspect ratio—seemingly perfect for showing letterbox movies. The electron24 displays an image measuring nearly 19 by 12 inches, compared with 16 by 12 inches on a 21-inch monitor.

The unusual aspect ratio is a mixed blessing. To have the monitor display the maximum resolution of 1,920 by 1,200 pixels, you need to install iXMicro's ix3D Ultimate Rez graphics card (optionally included in the package). Unfortunately, the card doesn't support any other resolution appropriate for the monitor, such as 960 by 600 pixels. Instead, you get a standard selection of high-resolution display options that are more suitable for a 21-inch display. If you pick one of these resolutions, the picture appears stretched across the screen. You can use on-screen controls to scale the picture horizontally, but then you're left with a wide border on each side, defeating the purpose of a 24-inch display—and the extra $700 or so you shelled out for it.

The electron24 uses a Sony Trinitron aperture-grille CRT, and image quality is good—but not great—compared with image quality of the best of the 21-inch monitors we've tested (see "Think Big," elsewhere in this issue). In Macworld Lab tests, the monitor received high marks for brightness and color reproduction but only average scores for sharpness. At the default resolution, 8-point text in one of our test documents looked a little blurry, but sharpness was otherwise acceptable.

A ten-button array on the front of the monitor lets you adjust color, picture size, positioning, and other settings. It's a convenient arrangement once you get the hang of it, but the buttons are so closely spaced that it's easy to hit the wrong one.

A plastic hood is included to block out ambient light. A nice touch, perhaps, but it doesn't do much to enhance the viewing experience.

Macworld's Buying Advice The electron24 costs upwards of $700 more than the 21-inch Apple Studio Display with ColorSync and Mitsubishi's Diamond Pro 2020u—*Macworld* Editors' Choice picks for best general-use 21-inch displays—and scored only average ratings for text sharpness. But if you really need those extra pixels, the image quality is more than adequate.—STEPHEN BEALE

RATING: ♦♦♦ **PROS:** Good color quality; wide aspect ratio. **CONS:** Expensive; limited resolution options. **COMPANY:** LaCie (503/844-4500, www.lacie.com). **COMPANY'S ESTIMATED PRICE:** $2,199; with Ultimate Rez, $2,459.

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Action GoMac 2.0

CONVENIENT LAUNCHING TOOL DOES WINDOWS ONE BETTER

MANY MAC USERS ARE LOATH TO admit it, but Windows 95 and 98 include one navigation tool superior to anything found in the Mac OS—the Start menu and the accompanying task bar. Power On Software has evened the score by releasing Action GoMac 2.0, a navigation and launching utility that not only mimics but actually improves upon its Windows counterpart.

Action GoMac comprises four basic components—a Start menu for accessing recent items, bookmarks, Internet applications, commonly used applications such as those found in Microsoft Office, and the contents of drives attached to your Mac; a QuickLaunch area akin to Apple's Launcher; a task bar that lets you switch easily among open applications with a single mouse-click; and the Clock Tray, which contains a clock and pop-up calendar. A single, unobtrusive gray bar at the bottom of your Mac's screen contains these four components. From the GoMac control panel, you can choose to reveal this bar only when your cursor moves to the bottom of the screen, hide background applications, and configure GoMac's application-switching key combination.

GoMac Go! Action GoMac 2.0 offers quick access to often used items.

GoMac's drag-and-drop support is extensive. For example, to add an item to the Start menu or QuickLaunch, you simply drag its icon to either area. Removing items from QuickLaunch is simple—just click and hold on an item and then select the Remove command from the pop-up menu. Removing an item from the Start menu takes a few more steps; you have to select Start Menu Items from the Settings hierarchical menu and drag the item's alias out of the Start Menu Items window. We prefer Now Utilities' method of removing items—you simply highlight the item and remove it by pressing the delete key.

The task bar's pop-up menus are also helpful. For example, using these pop-up menus you can quit a background application without returning to it, produce the application's Get Info window, see how much memory the program uses, and add the program to the QuickLaunch area. Clicking and holding on the Finder button allows you to bring any open window to the fore—very convenient when open windows are stacked atop each other.

It's possible that some of these features sound familiar to you. After all, can't you do many of the same things with the Apple menu and Launcher or an advanced macro utility such as WestCode Software's One-Click? To a certain extent, yes. The difference is that Action GoMac is already configured and ready to go—no mucking about with folders, buttons, and scripts.

Macworld's Buying Advice Action GoMac 2.0 is one of those utilities you could probably manage to live without, but its convenience is hard to resist. Try the 30-day demo and see for yourself.—CHRISTOPHER BREEN

RATING: ♦♦♦♦ **PROS:** Convenient navigation features; extensive drag-and-drop support; easy windows management. **CONS:** Removing items from Start menu could be easier. **COMPANY:** Power On Software (800/344-9160, www.poweronsw.com). **LIST PRICE:** $40.

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VSE HTML Turbo 2.0

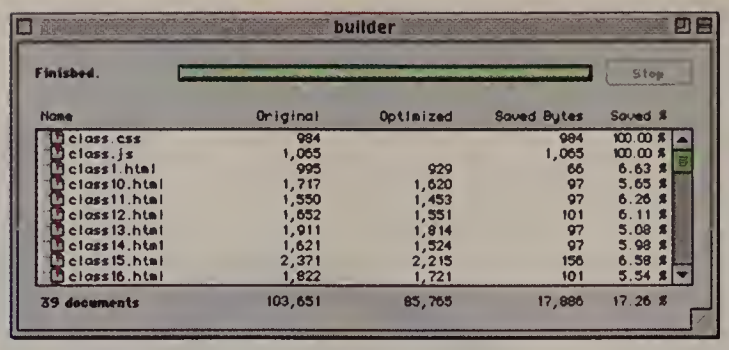
FLAWED WEB-PAGE OPTIMIZER

WE'VE ALL HEARD THAT TIME is money. On the Internet, however, disk space is both time *and* money. Larger files not only take longer to transmit to browsers but can also lead to additional charges from ISPs for taking up disk space and bandwidth. Voget Selbach Entertainment's VSE HTML Turbo 2.0 purports to optimize your HTML files, but bugs and design flaws prevent it from living up to its promise.

HTML Turbo does its job in three ways. First, it removes the spaces, carriage returns, and tabs that make files more readable to humans but that browsers don't care about. Second, it removes the attributes that WYSIWYG editors (such as Adobe GoLive) add but that aren't actually part of the HTML. Unfortunately, this internal list of unnecessary attributes is incomplete, and you can't add to it. Third, HTML Turbo helps browsers render pages faster by adding height and width attributes to images and closing slashes to URLs.

The program succeeds, to a certain extent: it rapidly shrunk our test sites 10 to 20 percent, doing a better job on files created with WYSIWYG editors than on those created by hand. But it also throws the baby out with the bathwater, deleting the contents of any external style sheets and JavaScript files (see "The Dog Ate My Web Site"). And it deletes all JavaScript comments unless you choose not to compress anything inside **<SCRIPT>** tags; this makes the program less useful for JavaScript-heavy sites.

Ironically, while developers of larger sites would be the most likely to benefit from HTML Turbo, they're also the ones who will have trouble incorporating it into their workflow process. For example, professional-level WYSIWYG tools let you do everything from editing pages to uploading your site to a server. With HTML Turbo, you create the site with your editor, run it through HTML Turbo, and then manually upload it to your server. That's a lot of overhead just to shrink the file by 10 percent. And because the program isn't scriptable, you can't add FTP functionality yourself.

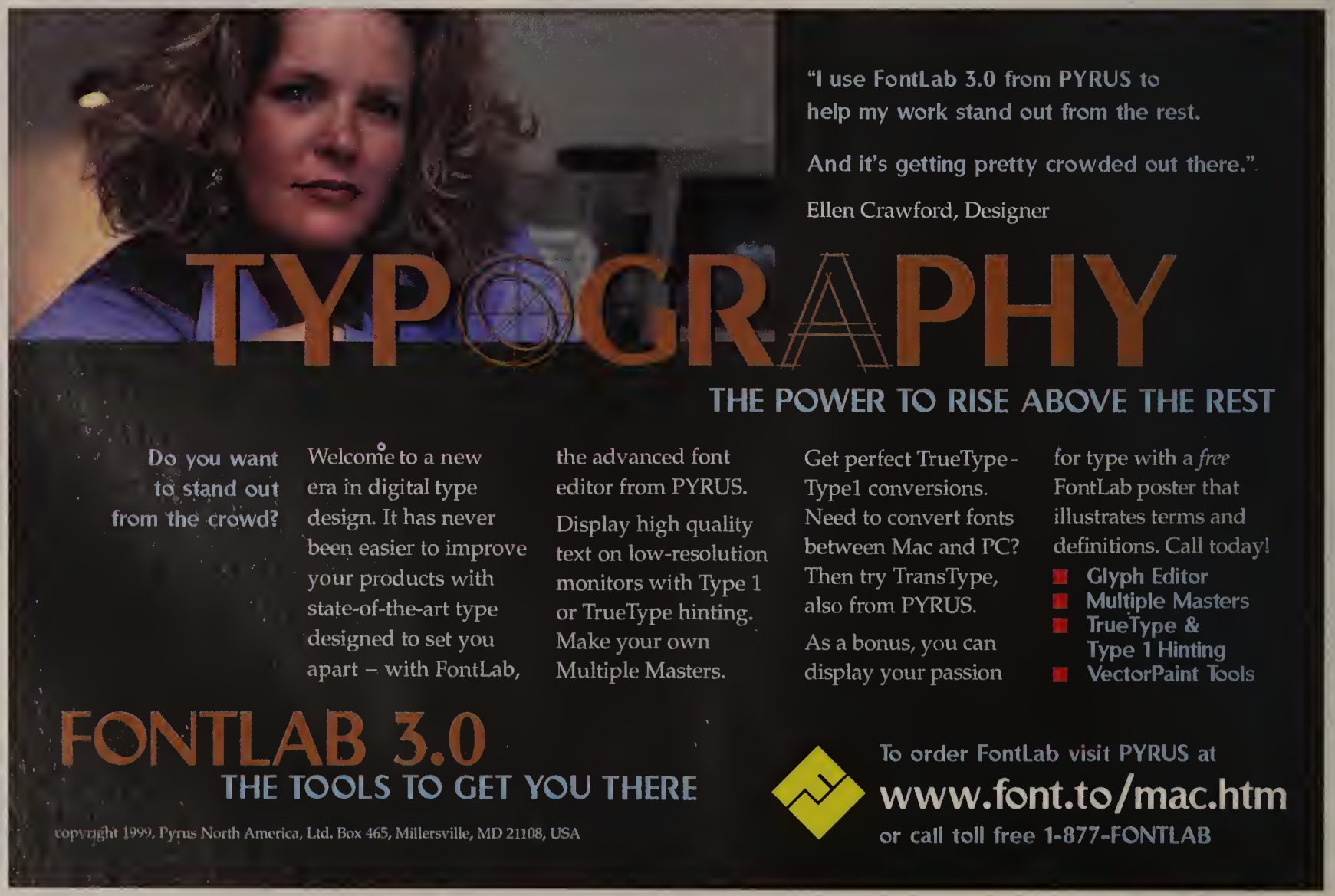


The Dog Ate My Web Site VSE HTML Turbo 2.0 tells you how much space it's saved, by file and by site. (But don't get excited about 100 percent optimization; it may mean your files are gone.)

Although Voget Selbach Entertainment is in Germany, its technical-support staff always answered my e-mailed questions within 24 hours. This is particularly helpful considering that the manual contains a number of errors and is difficult to understand.

Macworld's Buying Advice If your site is primarily text and you need to cut down on disk space and bandwidth, VSE HTML Turbo 2.0 might be worth checking out. For anyone else—particularly those who use JavaScript or style sheets—the results aren't worth the trouble.—DORI SMITH

RATING: ▮▮ **PROS:** Optimizes Web pages quickly; adds size attributes for images. **CONS:** Buggy; can't use on sites with external style sheets or JavaScript files; can't add to attributes list. **COMPANY:** Voget Selbach Entertainment (support@vse-online.com, www.vse-online.com). **LIST PRICE:** $50.



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Printdesk 2.5

PRINT SERVER OFFERS EASY SETUP

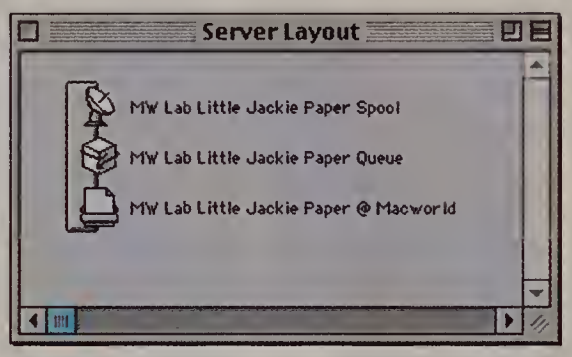
PUBLISHING PROFESSIONALS seeking a speedy way to spool their print jobs—without resorting to a Windows NT or Unix server—should look at Printdesk 2.5, an easy-to-use print server from Ultimate Technographics. Printdesk speeds printing operations by providing centralized print queues linked to specific output devices. Sending print jobs to the queue is generally much faster than sending them directly to the printer. Printdesk also goes beyond basic print-spooling functions by letting you manage jobs after they've been placed in the queue.

Installing Printdesk is straightforward, although you do need to plug in an ADB hardware lock. Because print spooling is not a hardware-intensive task, you can use a relatively old Power Mac as your server.

Once you've installed the program, setting up print queues is easy: you just choose a printer and name a queue, and you're all set. To print the job from a Mac client, you simply select a queue from the Chooser.

Ultimate claims that outputting your jobs via a Printdesk queue is up to 50 percent faster than printing directly to a PostScript device. However, we saw a relatively modest 30 percent speed boost when printing a 16-page QuarkXPress document—about the same speed improvement you'd get printing to an AppleShare server.

Printdesk distinguishes itself from a traditional server's print spooler by giving you many options for managing jobs after they're placed in the queue. For example, you can designate a portion of the server's hard drive to store jobs after they're printed. You can then redirect the job to a different output device—a useful productivity feature if you want to proof a job on an inexpensive printer before sending it to a more costly one. You can also modify toner density, screen frequencies, calibration, scaling, page orientation, and many other variables directly from Printdesk.



Queued Up Printdesk 2.5 makes it easy to set up custom print queues.

The interface, while not particularly difficult, has a few quirks. Some settings are changed under Options and others under Preferences, a seemingly arbitrary distinction. The Spool window, which shows the contents of each queue, lists jobs in the order received; we'd prefer that it list them in reverse order, because the most recent job is usually the one you're primarily interested in.

On the plus side, the central logbook, which shows the status of all current jobs, is easier to read than AppleShare's and also lists information you won't find in the AppleShare log, including physical page size, print-job duration, and job size.

Macworld's Buying Advice Printdesk 2.5 is a good value for small prepress firms or design shops that want to speed printing without hassling with a high-end server. The company also offers a $1,995 version that includes Open Prepress Interface (OPI) capabilities.—KEVIN MITCHELL

RATING: ♦♦♦½ **PROS:** Fast; easy setup; extensive printing options. **CONS:** Quirky interface. **COMPANY:** Ultimate Technographics (800/363-3590, www.ultimate-tech.com). **LIST PRICE:** $495.

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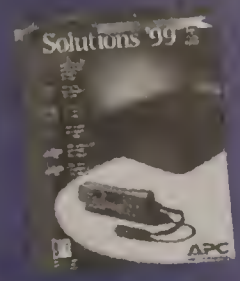

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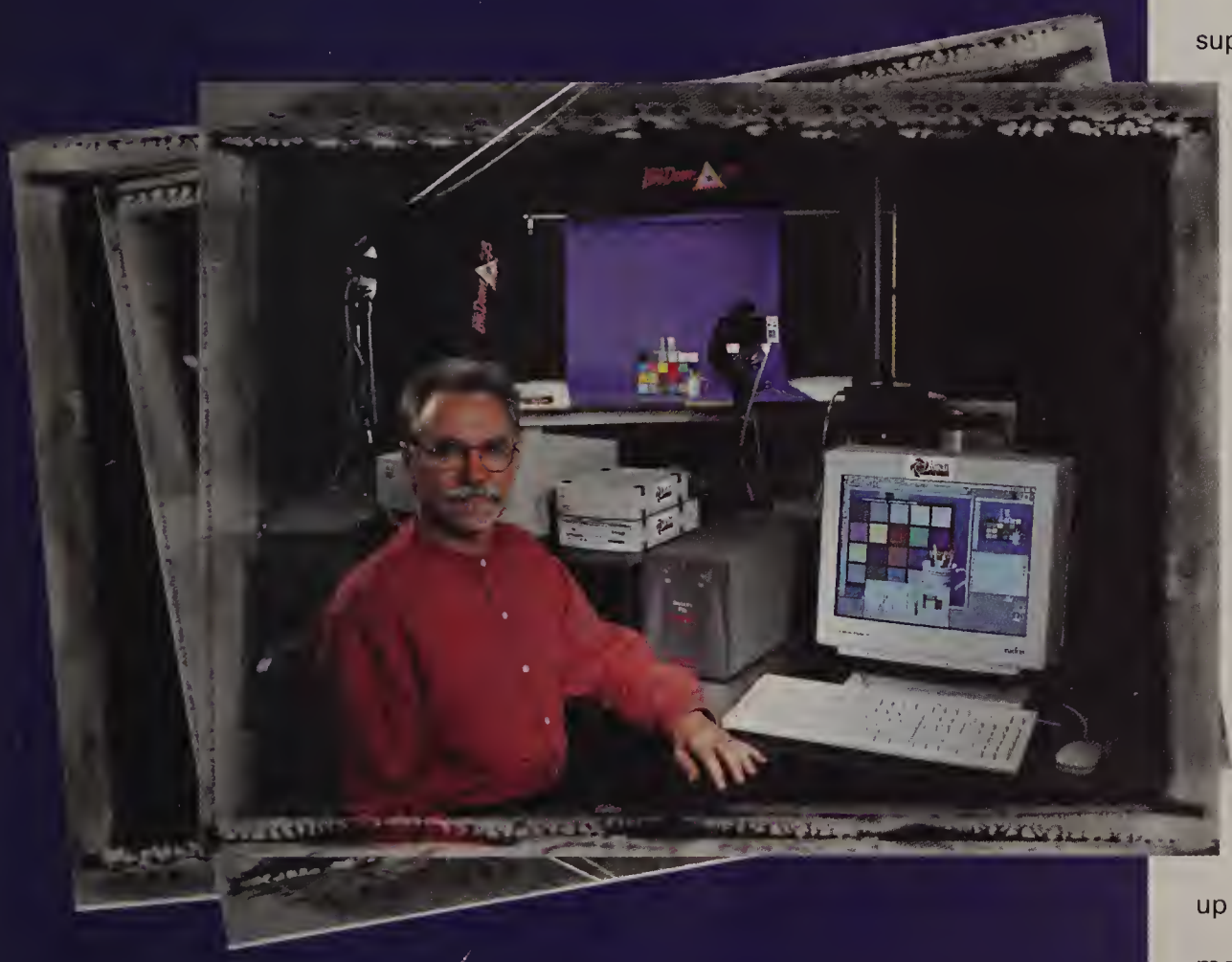

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UGate II

INTERNET-ACCESS SERVER FALLS SHORT

ECONOMICAL INTERNET-ACCESS servers are all the rage for multiuser LAN Internet access and remote telecommuting, and several vendors have delivered products tailored to the needs of Mac users. Now Umax Technologies has entered the fray with the UGate II, a two-line shared-access server that offers both a shared Internet connection and dial-in telecommuter access. It lacks Mac-specific documentation, however, and doesn't support AppleTalk networking.

The package includes the modem-size UGate II server (which has a built-in four-port hub), a power supply, one Mac 8-pin DIN serial adapter, and a thin manual. You connect the modems and your Macs using your own cables; if you're using two Mac modems, you need a second DIN adapter. Web-based administration screens make configuration simple, and support for Dynamic Host Configuration Protocol (DHCP) and Network Address Translation lets you configure the TCP/IP settings for your hosted computers using a single dynamic IP address from your ISP. Alas, the installation instructions explain setup only for Windows users. The manual doesn't explain how Mac DHCP works, and getting the unit to assign an initial IP address automatically requires resetting the UGate to its factory defaults.

GIBSON

The UGate supports two modems or ISDN terminal adapters in tandem, for a combined Internet bandwidth of up to 230 Kbps (it reached 220 Kbps in our tests). However, because the UGate has only two serial ports, you have to cut that bandwidth in half to allow dial-in access. Virtually all competing shared Internet servers have three serial ports, letting you share aggregated bandwidth and telecommuting access simultaneously. And because the telecommuter feature supports only TCP/IP, dial-in users can't access AppleTalk-only servers on your LAN.

The UGate's on-demand Internet routing feature dials up your ISP when users need access, dialing the second modem to increase bandwidth as demand warrants. Alternatively, you can configure the UGate to dial both connections simultaneously for continuous high-speed bandwidth. The UGate also supports user-level access controls to let you restrict the use of some Internet capabilities. You organize users into security groups and then limit Internet access by protocol for each group.

Macworld's Buying Advice The UGate II is a tough sell in the Mac market. Competing products offer much more functionality, albeit at a slightly higher price, and are tailored for Mac users. If Umax bundled the proper cables, provided Mac-specific documentation and support, and addressed the needs of Mac telecommuters by adding AppleTalk support, the UGate II could be a contender.—MEL BECKMAN

RATING: ❚❚ **PROS:** Built-in hub; telecommuter dial-in; user-level access controls. **CONS:** No Mac documentation or support; no dial-in AppleTalk; only two serial ports; no cables supplied. **COMPANY:** Umax Technologies (800/562-0311, www.umax.com). **COMPANY'S ESTIMATED PRICE:** $300.

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NORTH AMERICAN DESIGNER

(*Graphicus nocturnis*)

Description:
5' to 6'4"; (100-300 lbs). Large eyed, nocturnal, clothes hip; thin skinned frequent chin scratching.

Habitat:
Art Openings, Dive Bars, Design Retrospectives, Awards Dinners, Art Supply Stores.

Comments:
Appears in muted tones, paradoxically attracted to colors. Highly unadaptable to design changes.

Life Cycle:

PANTONE ColorSuite® for Graphics is critical during all stages of development:

Hatching

Graphicus is highly threatened in the nascent concept stage; instinctively avoids color selection danger using the **PANTONE Color Survival Kit** (**PANTONE Color Formula Guide, PANTONE Process Color System® Guide** and **PANTONE Solid To Process Guide**) stored in belly pouch.

Courtship

Flamboyant plumage precedes the mating ritual. Shows off colors on-screen with **PANTONE ColorReady™** plug-in for QuarkXPress™, Adobe® Illustrator® or Macromedia® FreeHand®, to compare output of printer, proofer and on-press. Feathers nest with color palettes built in **ColorReady™**. Culminates in frenetic approval dance with client.

Reproduction

Reproduction insures the species' future. Note how the designer creates an accurate, predictable reproductive environment using **PANTONE Personal Color Calibrator™**, to match monitor and printer color output.

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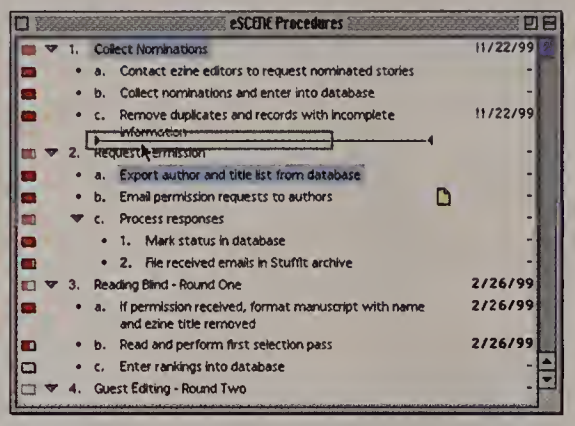
BrainForest Professional

PALM-BASED OUTLINER COMES TO THE DESKTOP

OUTLINING IS NO LONGER reserved for writing school term papers; whether you're maintaining important lists of information or managing complex projects, hierarchical outlines offer a flexible structure for organizing everyday data. Aportis Technologies' BrainForest brought outlining capabilities to Palm devices, and now BrainForest Professional 1.0 brings them to the desktop. With the exception of some version 1.0 quirks, BrainForest Pro is a useful outliner, even for those who don't own a Palm.

BrainForest's name comes from the metaphor it uses to organize data: outlines are *trees*, which contain *branches* of items and subitems, ending with *leaves*, the deepest level of the hierarchy. Each branch or leaf exists as either a normal item or an action item; a check box indicates whether the item has been completed.

Beginners may think that they've missed the forest altogether when they first open the application. A new BrainForest tree is the essence of Macintosh minimalism: a blank window labeled Untitled. Although Aportis is deliberately echoing the Palm OS's sparse interface, a small tool bar or floating palette containing basic controls would be a welcome addition.



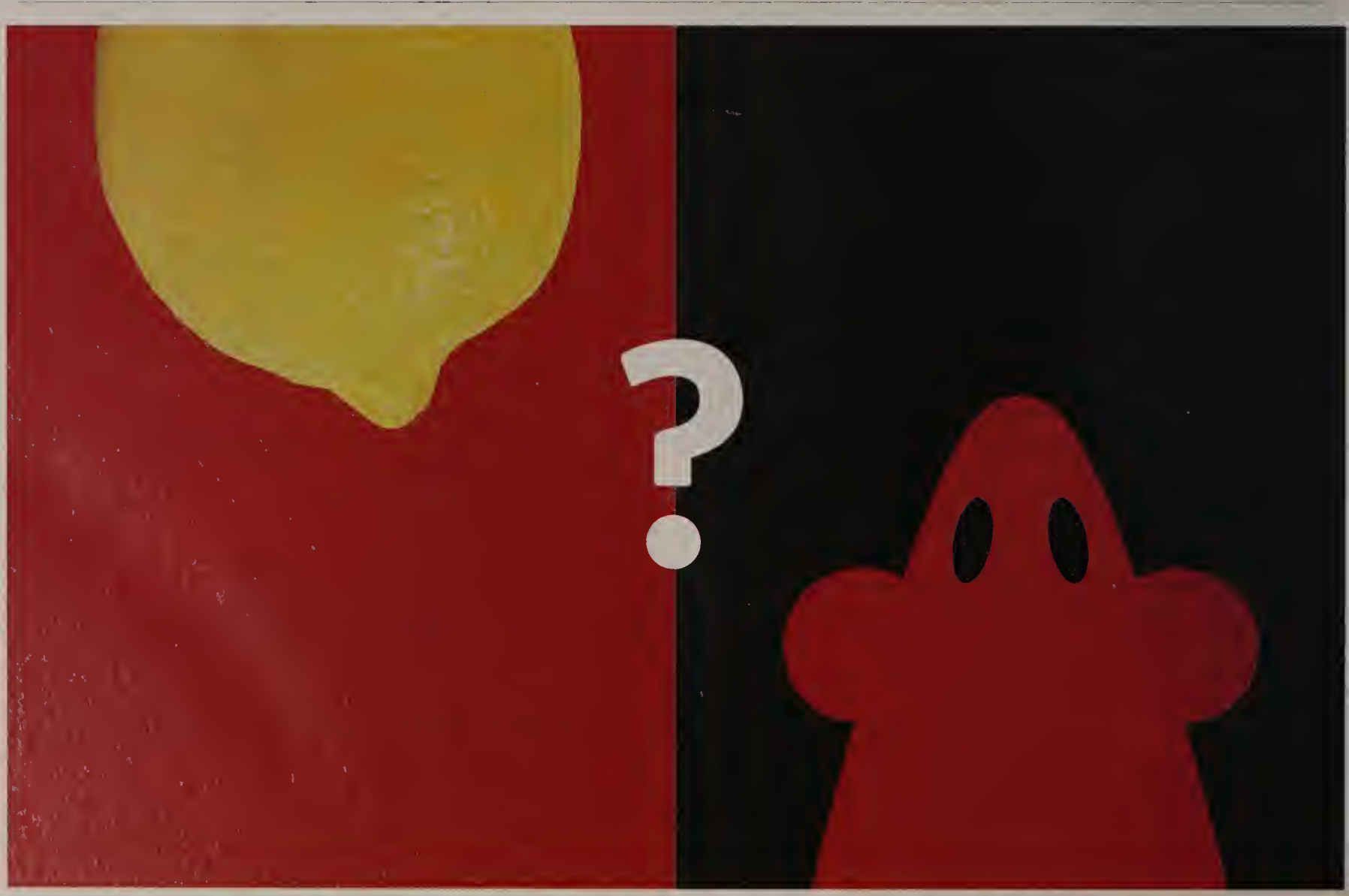
Outlining Isn't a Drag BrainForest Professional makes it easy to see where dragged items will end up.

You can use BrainForest outlines for scheduling by switching the tree's type from Standard to Project. The check boxes beside action items become bar indicators, measuring completion in percentages that you can change by clicking on them and selecting from a pop-up menu. You can assign start and end dates and a priority level, and specify the item as a repeating event or task.

BrainForest's approach to synchronizing data with the Palm is a bit awkward: instead of updating data on a record-by-record basis, as the built-in Palm applications do, BrainForest stores its files for installation when you perform the next HotSync operation. This method was the only one available to users of the original MacPac software, but given the open-conduit architecture of the current Palm Desktop 2.1, record-level synchronization should be a priority in the next release.

Macworld's Buying Advice If you already use BrainForest on a Palm, you'll appreciate being able to enter larger quantities of information by keyboard with BrainForest Professional. For those who don't own a Palm, BrainForest Pro offers an inexpensive outlining solution. When Aportis adds record-level synchronization and expands the minimalist interface, BrainForest Pro will be indispensable for keeping your life's data organized.—JEFF CARLSON

RATING: ♦♦♦♦ **PROS:** Flexible outline creation and editing; integrated project-management features. **CONS:** Sparse interface; no record-level synchronization. **COMPANY:** Aportis Technologies (888/276-7847, www.aportis.com). **LIST PRICE:** $40.



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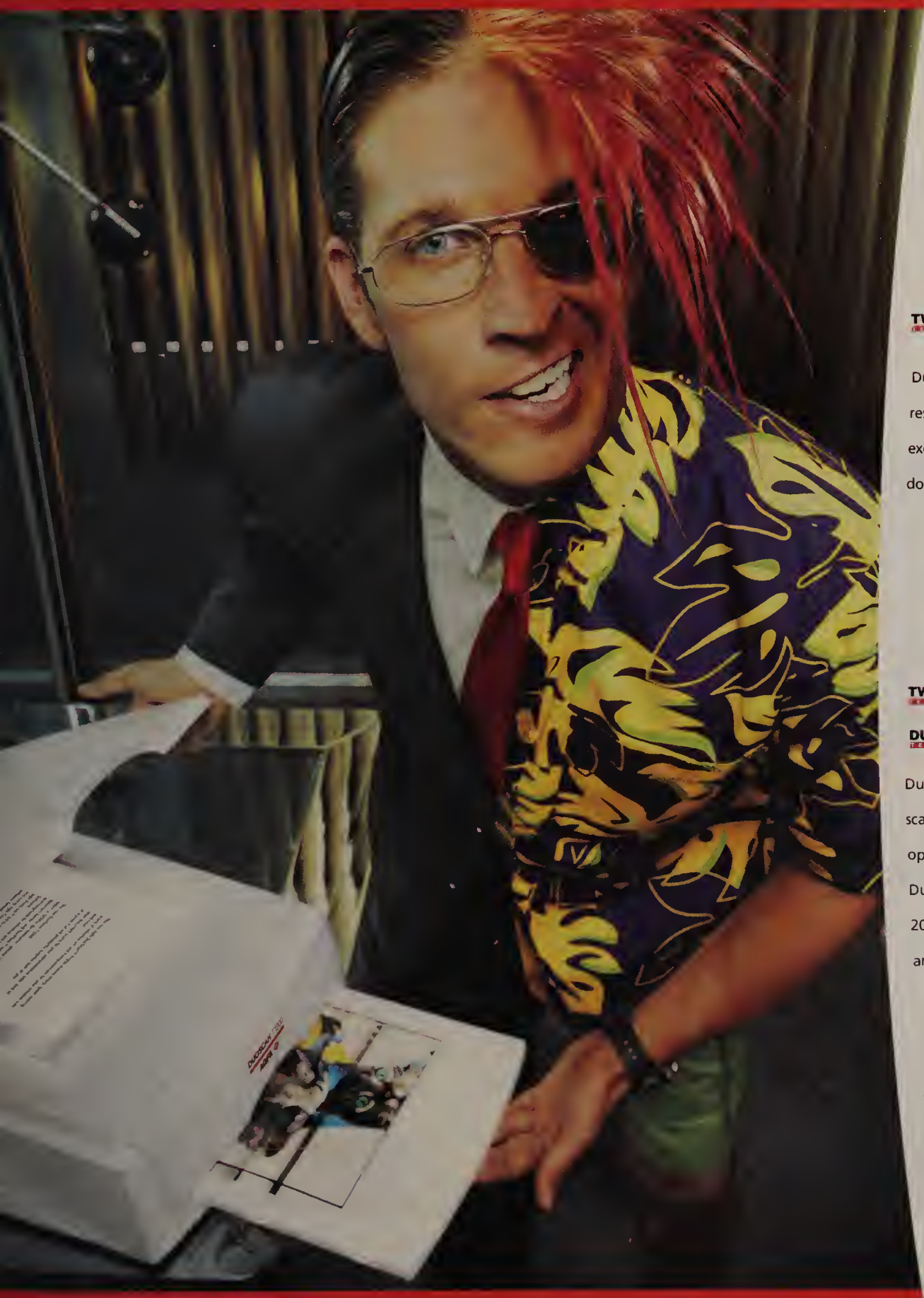

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The Game Room

Your Cheatin' Heart

FAVORITE GAME GOT YOU STUMPED? HERE'S HOW TO TAKE THE EASY WAY OUT.

by Christopher Breen

What is it about games that brings out the worst in people? Take my mother, for example. In most circumstances, Mom is as honest as the day is long. She's known throughout her community as a returner of dropped wallets and corrector of undercharging grocery clerks. But catch her playing solitaire, and you'll witness a ghastly transformation. The brow furrows; her soft brown eyes adopt a dark, foreboding hue; and from her mouth emerge phrases more appropriately found within the pages of *How to Speak Like a Merchant Marine in Ten Easy Lessons.*

As a veteran gamer, I naturally take this in stride. I understand that games can be vexing. What is far more troubling—and it pains me terribly to write these words—is the cheating. Heaven forbid that her 1040 form is off by a single penny, but find an ace of hearts that's inconveniently buried behind the jack of clubs and the seven of diamonds, and in the wink of a fairly sprightly eye that ace magically finds its way into the build pile with the jack and seven seemingly undisturbed.

"After all," she claims as she slips another one over on her invisible opponent, "it's only a game, dear."

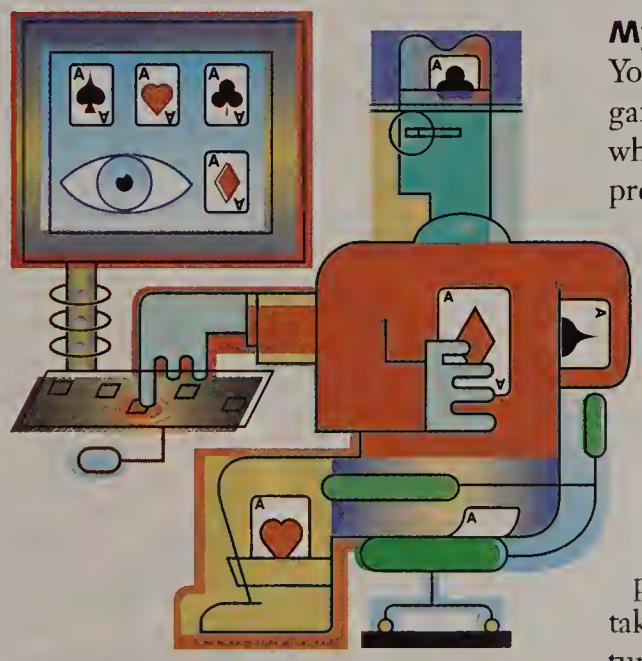
And so with these words I dedicate this, my first *Game Room* column, to my mother and all the other big, fat—and in point of fact my mother is quite slender—cheaters of the world. The following cheats are for those who can't stand to let a computer game get the better of them or those who—though virtuous in every other respect—simply lack the moral fiber to get the job done honestly.

The Sneaky Bits

Most people think that using a cheat code is the only way to earn a dishonest reward—and don't worry, we'll get to those in a bit—but first, there are some other methods for weaseling your way through games, as I outline below.

Diablo

Oh yes, you'll go straight to Hades for using this one, but what the hell, it's only your soul. You can duplicate items in your inventory by doing the following:



Drop the item to be duplicated and walk several paces away. Now click on the item, and just as your character picks it up, click on one of the eight items in your belt (that area of the screen where you keep potions and scrolls for easy access). If you've timed it correctly, the item you've selected in your belt will now "float" as it does when you've normally selected it, but the duplicated item's name appears in the description box. To collect your reward, drop the floating item. When dropped, it turns into the item you wished to duplicate. Of course, you lose the floating item for good when you do this, so don't click on a belt item you desperately need. Timing is crucial, and you'll find that you fail to duplicate items more often than you succeed. Once you succeed, however, you may find the means to afford the horrendously overpriced items Wirt has for sale.

Myth I and II

You can play any level of these two games by either pressing the spacebar when selecting New Game in Myth I or pressing the shift key when selecting New Game in Myth II.

Tomb Raider II

To skip to the next level, have Lara hold a flare, take one step forward and one step back, turn around fully three times, and then jump forward. To outfit Lara with the full complement of weapons, flares, and the like, place a flare in her hand and have her take one step forward and one step back, turn around fully three times, and then jump backward.

And finally, to get the comeuppance you and Mom so richly deserve for being the connivers that you are, perform either of the preceding without a flare in Lara's hand. That oughta teach you! **m**

Contributing Editor CHRISTOPHER BREEN is a coauthor of the *Macintosh Bible Guide to Games* (Peachpit Press, 1996).

CHEAT CODES Ah, so the "Diablo do-si-do" was too much bother? You didn't care for Lara's final trick? Then turn the page, and cheat codes built into today's most popular Mac games will be revealed.

QUAKE

To enter a code, first press the tilde key (~) to bring down Quake's console. Type the code, press return, and again press the tilde key.

GOD Gives you invincibility.
FLY You levitate; use D to go up, C to go down.
SKILL*x* Change your skill level (x = 0 to 3) between missions.
NOTARGET You're invisible until you attack.
NOCLIP You can walk through walls.

ROCKY MOUNTAIN TROPHY HUNTER

More animals to kill. More ways to cheat. Note that many of these cheats will trigger a derisive comment and that any trophies you capture will be branded with the cheater label.

While hunting, type:

BGBARBECUE Provides you with a rocket launcher.
BGSNIPER Turns weapon wobble on and off.
BGWEATHER Switches weather on.

At the map view screen, type the following:

BGSHOW Shows the location of all the animals.
BGTRACK Moves you instantly to the location on the map.
BGURINE Attracts animals to you.
BGVAMPIRE Reveals blood trail in map view.

At the main menu screen, type the following:

BGBULLWINKLE Only moose appear.
BGELKABONG Only elk appear.
BGHORNS Only sheep appear.
BGYOGI Only bear appear.
BGNOAH Twice the number of animals appear.
BGSTEROIDS Bigger animals.

UNREAL

To enter a cheat, press the tilde key, type one of the following codes, and press enter to engage the cheat. Many of these cheats also work in Klingon Honor Guard.

ALLAMMO Provides 999 rounds for the weapons in your possession.
BEHINDVIEW 1 View your character from behind.
BEHINDVIEW 0 Return the view to first-person perspective.
FLUSH Get rid of screen artifacts.
GHOST Walk through walls.
GOD Gives you invulnerability.
OPEN *map name* Go to the map of your choice (enter name of map for ***map name***).
SUMMON Bring forth a weapon, item, or player. For example, SUMMON HEALTH provides you with a health power-up.
FLY Fly around.
WALK Turn off effect of FLY and GHOST.

Note: The FLY and WALK cheats work in the opening sequence of both Unreal and Klingon Honor Guard. Use the arrow keys to move in any direction you'd like. To return to the ground, use the WALK code.

MASTER OF ORION II

While viewing the Galaxy screen, press and hold the control key and type the following cheat codes:

BELL Displays races for diplomacy.
DAVINCI Gives or removes omniscience.
EDISON Gives you all technology.
GATES Provides the current technology.
INTEL The Antarans attack.
SCORE Displays your score.
TRUMP Showers you with 1,000 BC.

LODE RUNNER 2

During a single-player game, press the escape key and type **glazed donut** (with the space, and, yes, spell ***doughnut*** as ***donut***). You'll hear a satisfying "Ha ha!" when you've done this properly.

Return to the game and enter the following codes:

F3 Go back one level.
F4 Go forward one level.
⌘-F12 Gain five lives.
⌘-8 Add ten bombs to each category.
⌘-K Beach ball power-up.
⌘-I Invisible power-up.
⌘-T Morph power-up.
⌘-B Cloak power-up.

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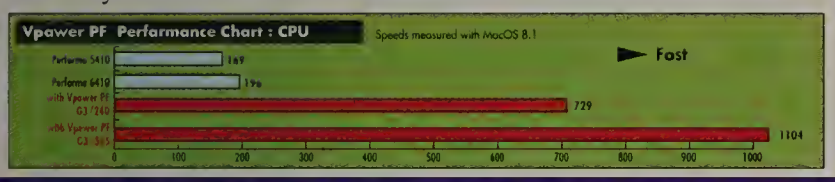

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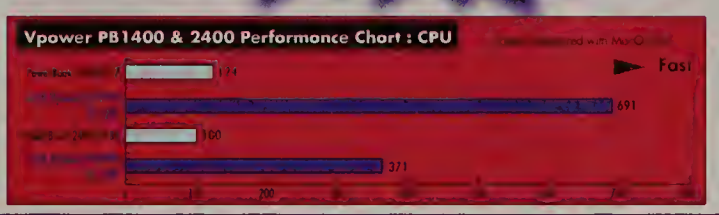

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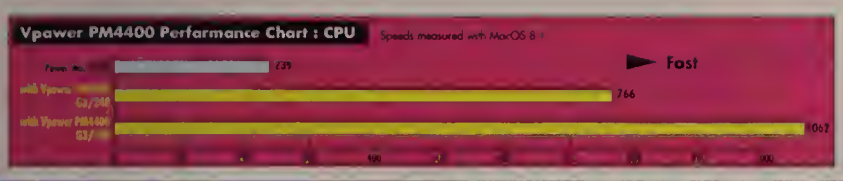

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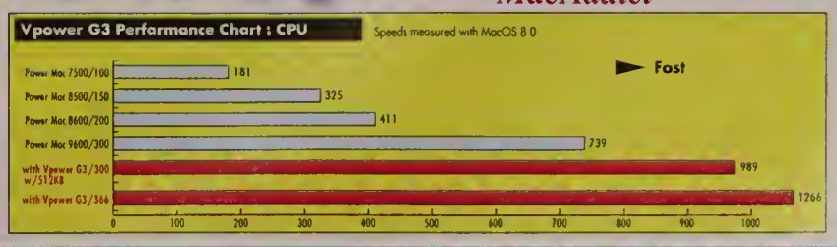

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Vpower PB 1400 G3/233	PowerBook 1400	G3/233MHz	512KB/117MHz	$ 469
Vpower PB 2400 G3/320	PowerBook 2400	G3/320MHz	1MB/160MHz	$ 899
Vpower PM 4400 G3/240	Power Mac 4400,7220 Motorola Star Max 3000, 4000 series	G3/240MHz	512/120MHz	$ 289
Vpower PF G3/240	Power Macintosh/Performa 54xx, 55xx, 64xx, 65xx, 20th Anniversary Mac Super Mac C500	G3/240MHz	512KB/120MHz	$ 339

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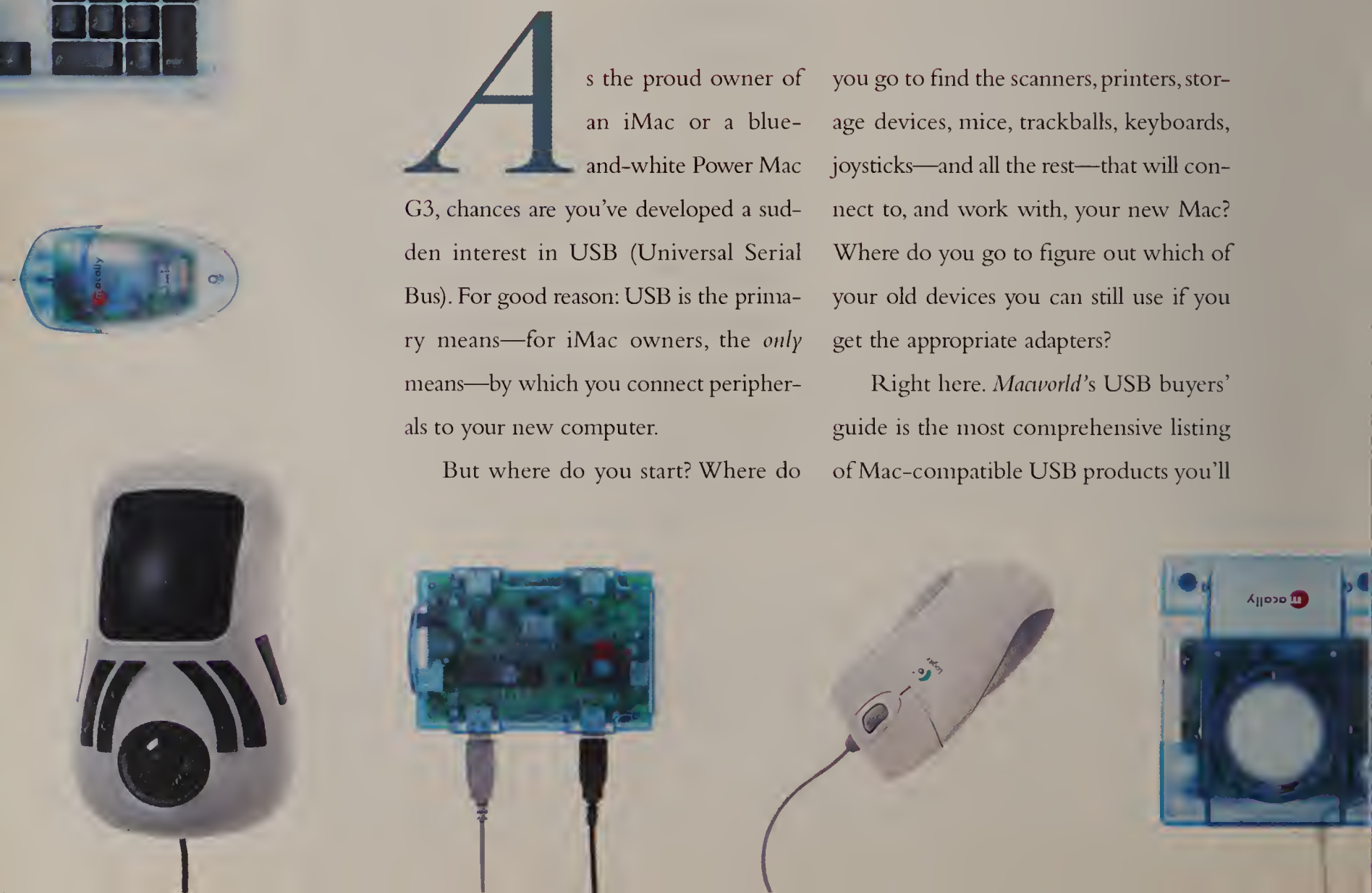
USB from A to Z

MAKE THE CONNECTION WITH THESE 201 ADD-ONS FOR YOUR COLORFUL NEW MAC

As the proud owner of an iMac or a blue-and-white Power Mac G3, chances are you've developed a sudden interest in USB (Universal Serial Bus). For good reason: USB is the primary means—for iMac owners, the *only* means—by which you connect peripherals to your new computer.

But where do you start? Where do you go to find the scanners, printers, storage devices, mice, trackballs, keyboards, joysticks—and all the rest—that will connect to, and work with, your new Mac? Where do you go to figure out which of your old devices you can still use if you get the appropriate adapters?

Right here. *Macworld*'s USB buyers' guide is the most comprehensive listing of Mac-compatible USB products you'll



find anywhere. We've surfed the Web, roamed the aisles of trade shows, and contacted every computer manufacturer we could find to compile this master list of USB products—201 in all—so that you can enhance the productivity and fun factor of your Mac.

We didn't stop there. We brought dozens of these products into Macworld Lab and put them to the test. We poked and prodded, timed and tested to sort the wheat from the chaff. We found some winners you'll want to know about. And we uncovered a few losers as well, which you should probably avoid. You'll find our reviews spread throughout the pages of this all-inclusive guide.

So what are you waiting for? Your USB adventure begins on the very next page. Join us as we take you through USB from A to Z. m

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Contributing Editor HENRY BORTMAN, with Senior Associate Editor ALLYSON BATES and Assistant Editor JONATHAN SEFF, compiled this list of USB products.

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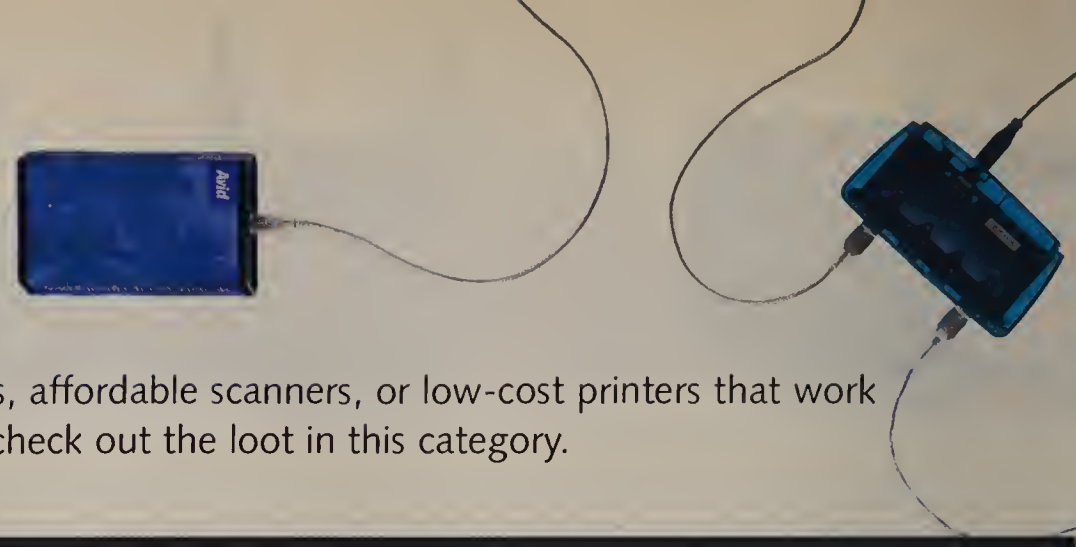


Digital Imaging

If you're hunting for USB cameras, affordable scanners, or low-cost printers that work with your new iMac or blue G3, check out the loot in this category.

Cameras/Video Capture

Company	Product	Price	Contact
Ariston Technologies	iSee	$130	800/326-5294, www.ariston.com
	iView	$109	
AVer Media	MVExplorer (or iPlut)	$199	800/863-2332, www.aver.com
Avid	Avid Cinema	$299	800/949-2843, www.avid.com
Kodak	DC220 Zoom	$699	800/235-6325, www.kodak.com
	DC260 Zoom	$899	
Logitech	QuickCam Pro	$150	800/231-7717, www.logitech.com
	QuickCam VC	$80	
Power R	iPresenter iP-10	$99	800/729-6970, www.powerr.com
Vista Imaging	USB ViCAM	$200	888/648-4226, www.vistaimaging.com

Improving Your Image

Kodak DC220 Zoom ♦♦♦½

Enhance your look with Kodak's megapixel DC220 Zoom. This USB-enabled camera bears an uncanny resemblance to Kodak's DC260 (♦♦♦♦; $899 list price; see "Megapixel Cameras," *Reviews,* February 1999). The DC220 offers a design and software bundle similar to its sibling's, and you can expect the same quality of images as well.

The main differences between the two models are their maximum image resolutions and zoom capabilities. The USB DC220 is capable of a maximum image resolution of only 1,152 by 824 pixels (just under 1 million pixels), and its optical zoom is limited to 2×.

Although $699 is a bit pricey, the DC220 is currently the least expensive USB camera. The USB connection eliminates having to fuss with a CompactFlash card for transferring images to your Mac.—HENRY BORTMAN

See-Through Printer

Epson Stylus Color 740i ♦♦♦♦

Why settle for a plain-vanilla ink-jet printer when you can have one that looks like an iMac? Epson's new Stylus Color 740i is functionally identical to the Stylus Color 740 (see *Reviews,* January 1999), but sports an iMac-inspired color scheme, complete with see-through colored plastic.

As you watch the gears turn, the versatile four-color printer produces great-looking text and graphics, including photos. Like its sibling, the 740i features built-in serial and parallel ports in addition to USB. Its case is blueberry, but for $15 you can order a cover that matches any of the other four iMac flavors.

Priced at $249—after a $30 Epson rebate—the Stylus Color 740i also features an unusual software bundle, including Polaroid PhotoMax Pro, ArcSoft PhotoPrinter, and ArcSoft PhotoBase. For $8, you can also choose 2 additional Mac titles from a list of 11, including Virex and Print Shop Deluxe.—STEPHEN BEALE

Printers

Company	Product	Price	Contact
Alps	Alps MD US8 Cable	$69	800/825-2577, www.alpsusa.com
CompuCable	uMater Parallel US8 Adapter	NA *	800/344-6921, www.compucable.com
Epson	Stylus Color 740	$249	800/463-7766, www.epson.com
	Stylus Color 740i	$279 (before $30 rebate)	
	Stylus Color 900	$499	
	Stylus Photo 750	$299	
	US8/Parallel Printer Adapter Kit	$39	
Hewlett-Packard	DeskJet 882C	$299	800/552-8500, www.deskjet.com
	DeskJet 895Cse/Cxi	$399	
	HP Printer Cable Kit	$69	
iMaccessories	iParallel US8 Printer Adapter	$50	888/622-8355, www.imaccessories.com
	iParallel with MacJet Software	$80	
Infowave	PowerPrint US8-to-Parallel	$99	800/663-6222, www.infowave.com
Momentum	uConnect for Printers US8-to-Serial	$84	888/671-4111, www.momentuminc.net

** Not available; pricing not set at press time.*

Scanners

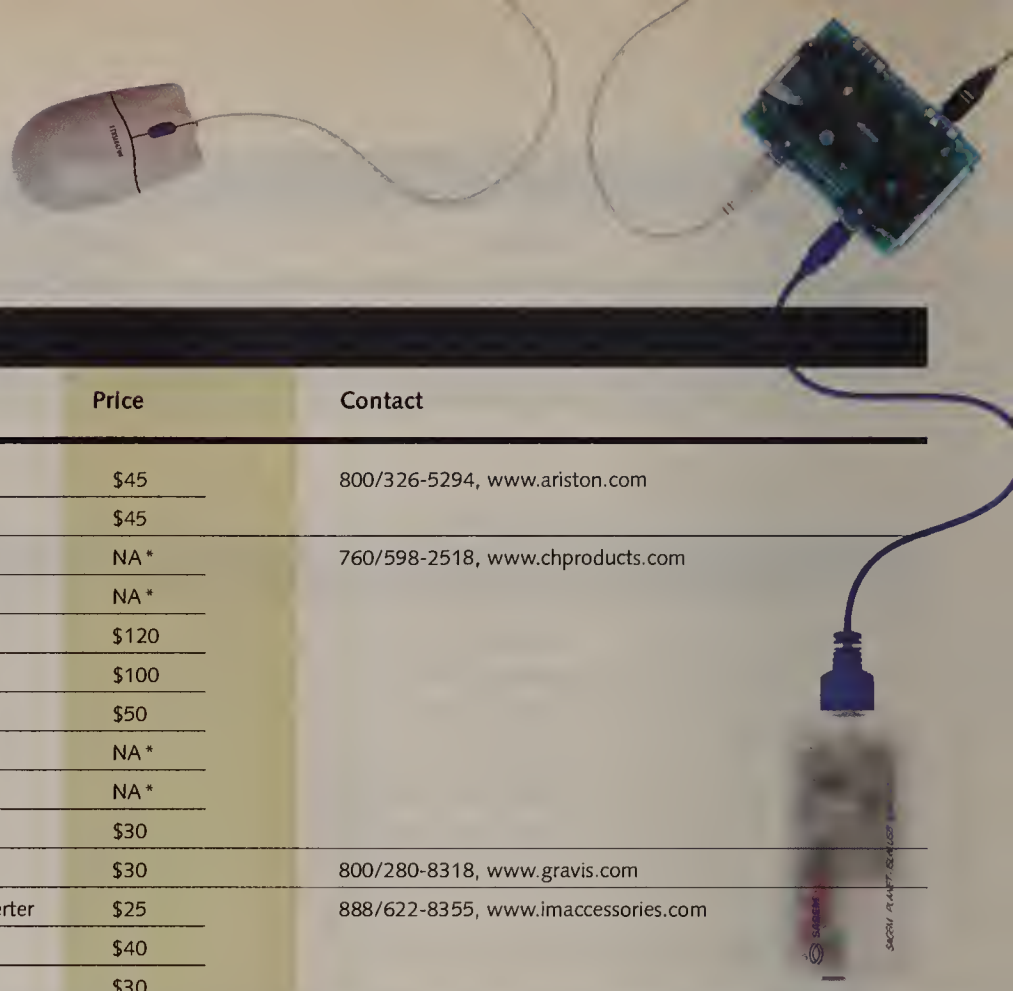
Company	Product	Price	Contact
Agfa	SnapScan 1212u	$129 (before $30 rebate)	888/281-2302, www.agfahome.com
	SnapScan 1212u (blue)	$129	
Epson	Perfection 636U	$229	800/463-7766, www.epson.com/cam_scan
Microtek	ScanMaker X6	$149	800/654-4160, www.microtekusa.com
	Slimscan C3	$79	
	Slimscan C6	$109	
Umax Technologies	Astra 1220U	$149	800/562-0311, www.umax.com

Input Devices

Yes, we *all* want to trade in the awkward round mouse for a new one. Take your pick from colorful mice, ergonomic trackballs, an artistic graphics tablet, or cool blast-'em-to-pieces game gear.

Keyboards

Company	Product	Price	Contact
Adesso	NU-Form for the iMac	$69	310/645-3746, www.adessoinc.com
Belkin	US8 Keyboard	$49	800/223-5546, www.belkin.com
iMaccessories	i8oard Ergonomic Keyboard	$80	888/622-8355, www.imaccessories.com
	iPad Keypad	$40	
Macally	iKey	$69	800/644-1132, www.macally.com
Microsoft	US8 Natural Keyboard Elite	$80	800/426-9400, www.microsoft.com



Joysticks and Game Pads

Company	Product	Price	Contact
Ariston Technologies	Ares	$45	800/326-5294, www.ariston.com
	Hermes	$45	
CH Products	CH Pedals	NA *	760/598-2518, www.chproducts.com
	F16 Fighterstick USB	NA *	
	Flight Sim Yoke USB	$120	
	Flight Sim Yoke USB LE	$100	
	Gamestick 3D USB	$50	
	Pro Pedals USB	NA *	
	Pro Throttle	NA *	
	USB Gamepad	$30	
Gravis	GamePad Pro USB	$30	800/280-8318, www.gravis.com
iMaccessories	iGame USB Standard Gameport Converter	$25	888/622-8355, www.imaccessories.com
	iPad USB Deluxe Arcade Controller	$40	
	iPad USB Reversible Game Controller	$30	
	iStick USB Flight Command Stick	$50	
Kernel Productions	JoyPort USB	$50	302/456-3026, www.kernel.com
Macally	iStick	$79	800/644-1132, www.macally.com
Macsense	FunPad F-103	$35	800/642-8860, www.macsensetech.com
	FunStick F-104	$45	
Saitek	Cyborg 3D USB Pad	$55	800/452-4377, www.saitek.com
	Cyborg 3D USB Stick	$75	
ThrustMaster	Fusion Digital Game Pad	$20	503/615-3200, www.thrustmaster.com
	TopGun USB	$35	

** Not available; pricing not set at press time.*

Graphics Tablets

Company	Product	Price	Contact
Wacom	USB PenPartner	$100	800/922-6613, www.wacom.com

Trackball Traction

Itac Mouse-Trak evolution ♦♦♦

Itac's Mouse-Trak evolution may be pretty to look at, but it's not very easy to use.

The contoured design of the Mouse-Trak fits nicely in your hand and provides excellent wrist support. The trackball is easy to control, but its six programmable buttons are not. You can't program the buttons' functions through a control panel. Instead, you must program the functions with the buttons themselves—a very arcane process with only confusing documentation as an aid.

Worse, there is no way to program the equivalent of a control-click, which means you can't use contextual menus without having to reach for the keyboard. Furthermore, double-click–dragging (to select a block of text word by word) is an uncomfortable operation.—HENRY BORTMAN

Game Pads—Command Your Controller

Ariston Hermes ♦♦♦½
Gravis GamePad Pro USB ♦♦♦♦
ThrustMaster Fusion Digital Game Pad ♦♦♦

Arcade gamers will be stoked to find that USB game pads have made the move to the Mac. Since game pads are traditionally bundled with console gaming systems, Ariston's Hermes, Gravis's GamePad Pro, and ThrustMaster's Fusion work best with arcade-style adventures.

The ThrustMaster and Ariston pads, modeled on Nintendo game pads, feature an eight-way directional pad; A, B, C and X, Y, Z buttons; and two "flipper" buttons at the back of the pad. The ThrustMaster game pad also carries two additional buttons in the middle of the controller (akin to the Select and Start buttons on Sony PlayStation controllers). Also, the two buttons underneath the pad make it awkward to operate. If you're accustomed to using Nintendo-style game pads, you'll be happier with the Ariston Hermes.

The Gravis GamePad Pro mimics a PlayStation controller, with an eight-way directional pad to the left of the controller, four buttons to the right, two center buttons, and four "flipper" buttons at the back. Unlike PlayStation controllers, however, the GamePad Pro includes a screw-in joystick handle for the directional pad. Because this game pad looks and feels like a PlayStation controller, it's a natural winner for those playing PlayStation games with Connectix's Virtual Game Station.—CHRISTOPHER BREEN

Clockwise from top: ThrustMaster Fusion Digital Game Pad, Ariston Hermes, Gravis GamePad Pro USB.

Joysticks—Playing the Games

Ariston Ares ♦♦♦½
Saitek Cyborg 3D USB Stick ♦♦♦♦

Unlike game devices of the past, the Ariston Ares and Saitek Cyborg 3D USB joysticks work only with those games that support Apple's Input Sprockets software technology. Although this means you won't have to muck about with proprietary control panels, it does mean you won't be able to use these sticks to play older games that don't support Input Sprockets.

Both joysticks feature a four-way hat switch, throttle control, and numerous other buttons—the Ares has eight; the Cyborg 3D, ten. The Ares also has a wheel you can use for rudder or pivoting control. The Cyborg 3D—much like Microsoft's ADB SideWinder 3D Pro—uses a twisting handle for these functions.

The Ares joystick is intended for right-handed users only, whereas you can configure the Cyborg 3D for left-handed users as well. The Cyborg's ambidextrous capabilities mean many buttons are placed—somewhat inconveniently—at the back and middle of the joystick. Although the Ares's controls are more accessible, the stick itself isn't easier to use. We recommend the Cyborg 3D. It's more solidly built, and both the throttle control and the stick are smooth as silk.—CHRISTOPHER BREEN

Ariston Ares (left), Saitek Cyborg 3D USB Stick

Trackballs

Company	Product	Price	Contact
iMaccessories	iTrack ProBall	$40	888/622-8355, www.imaccessories.com
Itac	Mouse-Trak evolution	$99	800/533-4822, www.mousetrak.com
	Mouse-Trak industrial	$295	
Kensington	Orbit USB Trackball	$50	800/280-8318, www.kensington.com
Macally	iBall	$69	800/644-1132, www.macally.com
	iBallPro	$79	

Rodent Replacement

Contour Design USB UniMouse 🐀🐀🐀
Interex USB-SM 🐀🐀🐀🐀½
Logitech MouseMan Wheel 🐀🐀🐀🐀
Logitech USB Wheel Mouse 🐀🐀🐀½
Macally iMouse 🐀🐀

It's only a matter of time before Apple's circular, translucent USB mouse drives you crazy. Fortunately, USB replacement mice are available in abundance.

Logitech offers two programmable mice equipped with convenient scrolling wheels that let you automate tasks: the MouseMan Wheel and the traditionally shaped three-button USB Wheel Mouse. The $50 MouseMan Wheel is oddly shaped but extremely comfortable. It's designed to naturally fit your *right* hand, however, so lefties are out of luck.

Both mice perform well, with one exception: moving a window so that the scroll bar is off-screen or the window displays across two monitors disables the scroll wheel.

Interex's three-button, programmable USB-SM—an excellent deal at $30—also has one button that doubles as a scrolling wheel, allowing continuous scrolling. (The translucent model is available for an extra $10.)

Be forewarned: you may have to download the Mac drivers for these mice. Both Logitech and Interex plan to provide Mac and PC drivers on CD, but in the rush to market, both companies began shipping USB mice to Mac users with PC drivers only—on floppy disks, of all things!

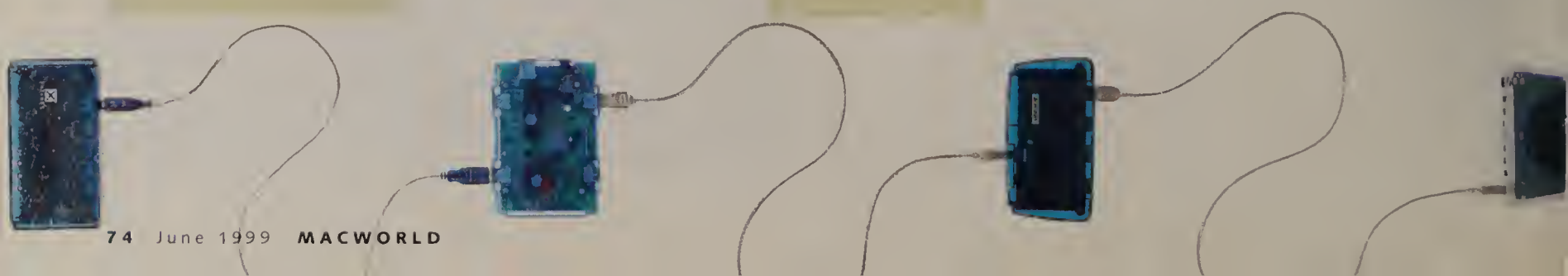
For color-conscious users, Contour Design's USB UniMouse is the first input device to be available in all five iCandy colors. Although these three-button mice are programmable, they lack the intuitive control panel found with Logitech and Interex pointing devices. For each different combination of button functions, you have to install a separate driver in your System Folder (and remove any other existing UniMouse drivers you may have previously installed).

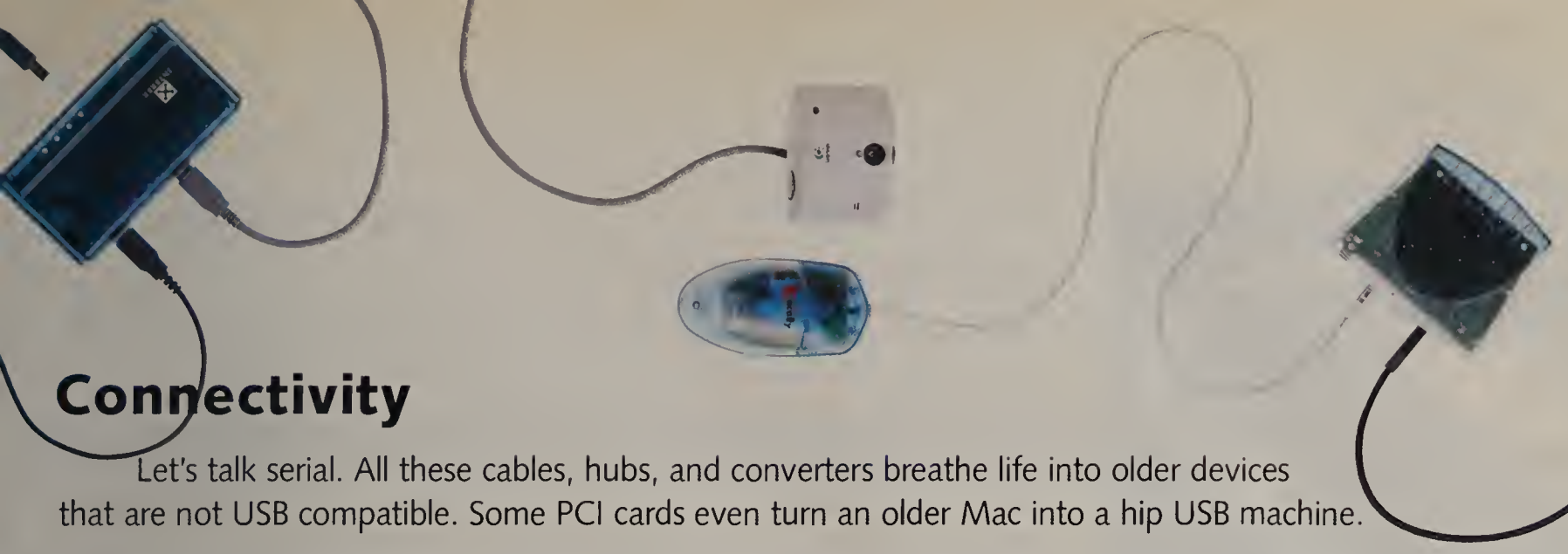
Macally's iMouse—a single-button, nonprogrammable replacement for the round, bundled Apple mouse—is a no-frills, colorful pointing device that's overpriced at $39. Our advice: invest in a mouse with more functionality for the same amount of money.—HENRY BORTMAN

Clockwise from top: Logitech MouseMan Wheel, Macally iMouse, Interex USB-SM, Contour Design USB UniMouse, Logitech USB Wheel Mouse

Mice

Company	Product	Price	Contact
Adesso	PowerMouse AM-5	$25	310/645-3746, www.adessoinc.com
Ariston Technologies	Podiki	$25	800/326-5294, www.ariston.com
Belkin	US8 Classic Mouse	$20	800/223-5546, www.belkin.com
CompuCable	US8 Mouse	$25	800/344-6921, www.compucable.com
Contour Design	US8 UniMouse	$43	603/893-4556, www.contourdesign.com
Fantom Drives	Fantom iMouse	$24	310/474-1685, www.fantomdrives.com
iMaccessories	iPoint US8 Mouse	$20	888/622-8355, www.imaccessories.com
Interex	US8-SM	$30	877/468-3739, www.interexinc.com
	USB-SMb (black)	$30	
Kensington	Mouse-in-a-Box	$30	800/280-8318, www.kensington.com
Logitech	MouseMan Wheel	$50	800/231-7717, www.logitech.com
	US8 Wheel Mouse	$40	
	WingMan Gaming Mouse	$40	
Macally	iMouse	$39	800/644-1132, www.macally.com
	US8 iMousePro	$69	
MacPower Peripherals	US8 1-8utton Mouse	$26	800/269-5465, www.macpower.com.tw
Microsoft	Intellimouse USB Compatible	$70	800/426-9400, www.microsoft.com





Connectivity

Let's talk serial. All these cables, hubs, and converters breathe life into older devices that are not USB compatible. Some PCI cards even turn an older Mac into a hip USB machine.

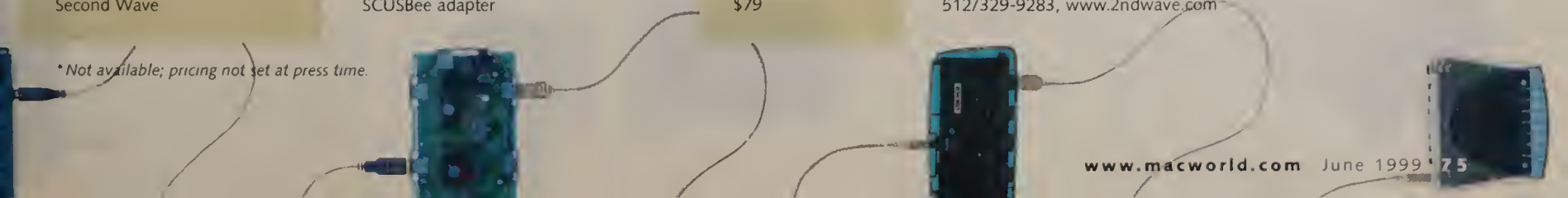
PCI Cards

Company	Product	Price	Contact
ADS	USB Port for Desktops	$50	800/888-5244, www.adstech.com
	USB Port for Notebooks	$90	
Ariston Technologies	iConnect PCI-to-USB Card	$45	800/326-5294, www.ariston.com
D-Link	PCI Controller Card	$45	800/326-1688, www.dlink.com
Entrega Technologies	PCI-2U Port	$40	949/859-8866, www.entrega.com
	PCI-4U Port	$70	
Interex	USB Dual-Port PCI Card	$55	877/468-3739, www.interexinc.com
Keyspan	USB PCI Card	$49	510/222-0131, www.keyspan.com
Macally	PCI-to-USB Adapter (UH-275)	$59	800/644-1132, www.macally.com
	PCMCIA-to-USB Adapter (UH-276)	$159	

Converter Cables

Company	Product	Price	Contact
Ariston Technologies	iConnect USB-Parallel Cable	$35	800/326-5294, www.ariston.com
	iSCSI Converter Cable	$79	
	iSerial USB-Serial Converter (2 port)	$149	
	iSerial USB-Serial Converter (4 port)	$299	
	USB A-to-8 Cable	$10	
CompuCable	USB-ADB Adapter	NA *	800/344-6921, www.compucable.com
	US8-SCSI Adapter	NA *	
	USB-Serial Adapter	NA *	
D-Link	USB A-to-B Cable	$15	800/326-1688, www.dlink.com
	USB-to-Parallel Printer Adapter	$39	
Entrega Technologies	USB Cables	$10–$20	949/859-8866, www.entrega.com
	USB to Ethernet	$100	
	US8 to Parallel	$50	
	USB to Serial	$80	
Griffin Technology	iMate AD8-to-USB Adapter	$49	615/255-0990, www.griffintechnology.com
Interex	US8-2A8i	$10	877/468-3739, www.interexinc.com
	USB-2XAAi	$10	
	US8-3XAAi	$13	
	USB-5ABi	$13	
Keyspan	USB Serial Adapter	$79	510/222-0131, www.keyspan.com
Microtech International	US8 XpressSCSI	$79	800/626-4276, www.microtechint.com
Momentum	uConnect USB-to-Serial	$84	888/671-4111, www.momentuminc.net
Newer Technology	uSCSI Adapter	$79	316/943-0222, www.newertech.com
Second Wave	SCUSBee adapter	$79	512/329-9283, www.2ndwave.com

*Not available; pricing not set at press time.



Serial Salvation

Keyspan USB Serial Adapter ♦♦♦♦

Who said only furry felines have nine lives? Thanks to manufacturers such as Keyspan, you can save orphaned serial devices, such as printers and modems.

The Keyspan USB Serial Adapter is a converter cable that plugs into a USB hub and provides two serial ports. The easy-to-use Keyspan adapter functions well and supports a wide range of devices, including select models of Apple StyleWriter and Hewlett-Packard DeskJet printers and all Epson printer models; Kodak, Olympus, and Nikon digital cameras; the 3Com Palm Pilot and Palm III; and all brands of standard external modems.

But there are restrictions. "Externally clocked" serial devices—those that control the data-transfer rate to the computer—are not supported, nor are LocalTalk devices.—HENRY BORTMAN

Hubs

Company	Product	Price	Contact
Adesso	4-Port Powered Hub	$50	310/645-3746, www.adessoinc.com
ADS Technologies	USB Hub	$70	800/888-5244, www.adstech.com
Ariston Technologies	4-Port Hub	$89	800/326-5294, www.ariston.com
	7-Port Hub	$179	
Belkin Components	ExpressBus (4 port)	$69	800/223-5546, www.belkin.com
	ExpressBus (7 port)	$99	
CompuCable	iDock	$200	800/344-6921, www.compucable.com
Computer Access Tech	Andromeda (4 port)	$50	800/909-2282, www.catc.com
D-Link	4-Port Hub	$59	800/326-1688, www.dlink.com
	7-Port Hub	$99	
Entrega Technologies	3-Port USB Hub with Ethernet	$130	949/859-8866, www.entrega.com
	4-Port Multi-function USB Hub	$150	
	4-Port USB Hub	$80	
	4-Port USB iMac Hub	$80	
	6-Port Multi-function USB Hub	$180	
	7-Port USB Hub	$100	
	7-Port USB iMac Hub	$100	
	7-Port Multi-function USB Hub	$200	
Fantom Drives	4-Port Hub	$45	310/474-1685, www.fantomdrives.com
iMaccessories	iBus USB 4-Port Hub	$50	888/622-8355, www.imaccessories.com
	iBus USB Host Adapter for Power Mac	$40	
InsideOut Networks	Edgeport/2	$229	512/301-7080, www.ionetworks.com
	Edgeport/4	$399	
	Hubport/4	$129	
	Hubport/7	$199	
Interex	USB-HP4	$60	877/468-3739, www.interexinc.com
	USB-HP4i (clear)	$60	
	USB-HP4ib (blue)	$60	
	USB View Hub	$80	
Keyspan	USB Hub	$69	510/222-0131, www.keyspan.com
Macally	iHub (4 port)	$79	800/644-1132, www.macally.com
Newer Technology	uHub (7 port)	$109	316/943-0222, www.newertech.com
Peracom	USB Quad Hub	$79	919/379-2700, www.peracom.com

Miscellaneous

Do you miss that floppy? No worries—our buyers' guide is bulging with USB storage alternatives. And don't bypass the audio and security sections.

Audio

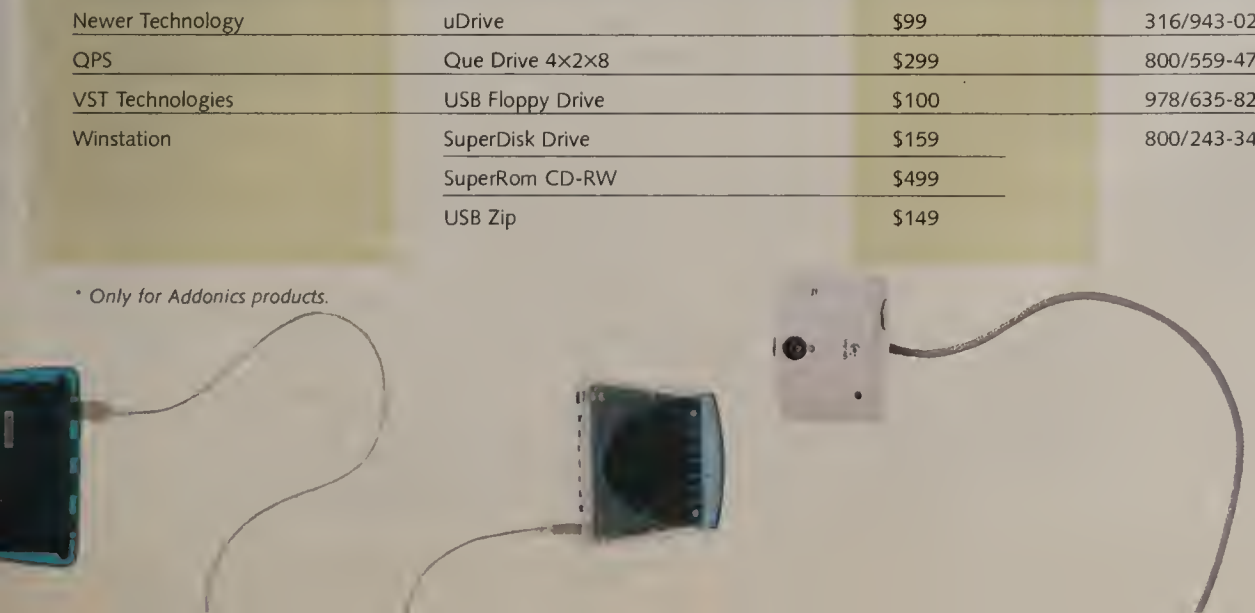
Company	Product	Price	Contact
Mark of the Unicorn	FastLane	$59	617/576-2760, www.motu.com
	Micro Express	$295	
	MIDI Express XT/USB	$395	
	MIDI Timepiece AV/USB	$595	
Opcode Systems	DATport	$250	650/429-2400, www.opcode.com
	MIDIport 32	$150	
	MIDIport 64	NA *	
	MIDIport 128	NA *	
	Sonicport	$300	
	Sonicport Optical	$300	
	Studioport	NA *	

** Not available; pricing not set at press time.*

Storage

Company	Product	Price	Contact
Addonics	USB Cable *	$50	800/787-8580, www.addonics.com
Agfa	Agfa ePhoto CL30	$399	888/281-2302, www.agfahome.com
Castlewood	ORB 2.2GB	$199	925/461-5500, www.castlewood.com
Fantom Drives	External USB Hard Disk Drive 4GB	$295	310/474-1685, www.fantomdrives.com
	External USB Hard Disk Drive 6GB	$349	
	USB CD-RW 2×2×6	$389	
	USB CD-RW 4×4×16	$529	
iDrives	iFloppy-USB	$100	888/650-8439, www.idrives.com
iMaccessories	iDrive USB Floppy Drive	$100	888/622-8355, www.imaccessories.com
Imation	SuperDisk USB Drive	$150	888/466-3456, www.superdisk.com
Iomega	Zip USB Drive	$150	800/697-8833, www.iomega.com
LaCie	10GB Hard Drive	$299	800/999-0670, www.lacie.com
	20GB Hard Drive	$399	
	CD-RW Drive	$299	
MacPower Peripherals	ID2 MP-2002	$99	800/269-5465, www.macpower.com.tw
	The Vault MP-2001	$99	
Microtech International	Mii Zip 100 USB Drive	$199	800/340-0197, www.microtechint.com
Newer Technology	uDrive	$99	316/943-0222, www.newertech.com
QPS	Que Drive 4×2×8	$299	800/559-4777, www.qps-inc.com
VST Technologies	USB Floppy Drive	$100	978/635-8200, www.vsttech.com
Winstation	SuperDisk Drive	$159	800/243-3457, www.winstation.com
	SuperRom CD-RW	$499	
	USB Zip	$149	

** Only for Addonics products.*



Filling the Floppy-Disk Void

iDrives iFloppy-USB ♦♦½
Imation SuperDisk USB Drive ♦♦♦♦
Newer Technology uDrive ♦♦♦½
VST Technologies USB Floppy Drive ♦♦½

If you're the owner of a bright and shiny iMac or a flashy new G3, you may need to consider buying an external floppy drive. Although the occasions to use a floppy are somewhat rare, what would happen if you needed to read a file from (or write one to) a floppy disk?

The iDrives iFloppy-USB, the VST USB Floppy Drive, the Newer Technology uDrive, and the Imation SuperDisk USB Drive solve this dilemma. The first three drives cost around $100 and are the standard floppy-disk drives you've seen on Macs of the past. The $150 Imation SuperDisk reads and writes floppy disks, but it can also read and write proprietary 120MB removable SuperDisk cartridges.

In our tests, all four drives worked for the simple reading and writing of files—although only the Imation drive autoejects floppy disks. For the other drives, dragging a floppy icon to the Trash won't eject the disk; you'll have to press the eject button.

The VST and iDrives devices were unable to install software from a set of multiple floppy disks, but the Newer and Imation drives performed this task without any problem. The iDrives and VST were also the slowest at mounting disks and copying files. The SuperDisk was the fastest at copying files, and the Newer uDrive was also speedy. The uDrive mounted a floppy in record time, beating the SuperDisk.

If you need a floppy drive, your best choice is Imation's SuperDisk. Its support for 120MB cartridges is adequate backup for your hard disk. Of the three standard floppy drives, we recommend the Newer uDrive for its speed and its ability to handle multidisk software installations.—HENRY BORTMAN

Clockwise from top: Newer Technology uDrive, Imation SuperDisk USB Drive, VST Technologies USB Floppy Drive, iDrives iFloppy-USB (bottom)

Modems

Company	Product	Price	Contact
Best Data Products	SmartOne USB Modem	$99	818/773-9600, www.bestdata.com
Global Village	TelePort USB 56K Fax/Modem	$160	800/331-1323, www.globalvillage.com

Security

Company	Product	Price	Contact
Aladdin Knowledge Systems	eToken	$18–$35	800/223-4277, www.aks.com
	MacHASP-USB	$15–$35	
TeraGlobal	FingerPrint Scanner	NA*	619/231-0555, www.teraglobal.com

**Not available; pricing not set at press time.*

Other

Company	Product	Price	Contact
Ariston Technologies	iMac Speakers	$30	800/326-5294, www.ariston.com
	iRead	$144	
CompuCable	USB-ABCD Manual Switch	$25	800/344-6921, www.compucable.com
Hermstedt	USB ISDN Adapter	$300	781/639-8902, www.hermstedt.com
Microtech International	USB CameraMate	$89	800/626-4276, www.microtechint.com
miro Displays	iBug for iMac	$119	650/988-7270, www.mirodisplays.com
Newer Technology	uFlash-CF	$89	316/943-0222, www.newertech.com
	uFlash-SM	$99	
SanDisk	USB ImageMate	$80	408/542-0500, www.sandisk.com
Simple Technology	PhotoReader	$130	800/367-7330, www.simpletech.com
Sophisticated Circuits	Kick-off	$199	800/769-3773, www.sophisticated.com

Think Surf.

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Macworld Lab Tests 21-Inch Monitors

BY STEPHEN BEALE AND MICHAEL GOWAN

It happens every time you open that spreadsheet. You're boosting capital investments in column B, but you have to scroll to column Z to see the long-term payback. You try zooming out, but the numbers shrink into unreadable specks of gray. . . .

You need a bigger monitor.

Graphic artists have long recognized the benefits of large-screen displays, which let you view your work in its full dimensions, with all your tools and palettes conveniently arranged. But with the average price of a 21-inch monitor now at about $1,200, these monitors aren't just the domain of designers anymore.

To help sort out your options, Macworld Lab examined 29 general-use 21-inch monitors, ranging in price from about $750 to $1,900 (see the table, "The Big Picture," for details about each model). Our panel of experts put the monitors through their paces, testing for display quality and ease of operation. We used objective and subjective tests to evaluate such factors as brightness, sharpness, and color display (see the benchmark, "The Eyes Have It"). We learned that while there are some bargains to be had, the best-looking 21-inch displays for general use will set you back at least $1,500.

Never fear, we didn't forget the designers among us, either: see the sidebar, "Think Accurate," for *Macworld*'s evaluation of four color-calibrated monitors for graphics pros, and check the table for their ratings.

The Basics

Before you begin your quest for the perfect monitor, here are a few pointers.

Tube Type The monitors we tested all use cathode-ray tubes (CRTs), still the most common technology for desktop displays. CRTs create images on the screen by using a gun to shoot a beam of electrons at red, green, and blue phosphors painted on the back of the screen, thus creating the range of colors you see on the screen.

CRTs come in two types: *shadow mask* and *aperture grille*. Each uses a different technology to direct the electron beams to the phosphors. A shadow-mask monitor aligns the beams of electrons as they pass through a sheet of metal riddled with a honeycomb of tiny holes. Aperture-grille monitors (which are often labeled with brand names such as Sony Trinitron or Mitsubishi DiamondTron) align the beams using an array of thin wires.

So what does that mean to you? Monitors that use shadow-mask technology are more common and often less expensive, but they can also offer poorer-quality images. Typically, fewer electrons are able to pass through the shadow-mask structure than through an aperture-grille one, which can mean a dimmer and less focused image. Manufacturers of aperture-grille monitors claim that their technology offers sharper images and richer colors. Overall, we found this to be true.

Flat Screens In the past, CRTs have always had a slightly curved screen, which can introduce subtle image distortions especially annoying to people working with exact shapes and measurements, such as CAD users. This year a few of our monitors—including Sony's GDM-F500; NEC's MultiSync FP1350; and one of our Editors' Choice winners, Mitsubishi's Diamond Pro 2020u—features an innovation: the flat-screen CRT. Because it removes the subtle distortion caused by a curved surface, a flat screen typically gives you a better-looking image and is also less prone to glare. In most cases, we found that the flat screen did improve image quality.

Resolution When you read the spec sheets for 21-inch monitors, it's easy to be impressed by the number of pixels they can display, but what does this really mean?

In most applications you'll want to view images and text at close to their actual dimensions, so a page that will be letter-size

PHOTOGRAPHS BY SCOTT PETERSON

Think Big

That Are Sure to Broaden Your Horizons

Macworld LAB TEST

Think Big

when you print appears letter-size on screen. This means choosing the resolution setting—the total number of horizontal and vertical pixels—that best matches the monitor size. On a 21-inch display, the optimal setting is 1,152 by 870 pixels—equivalent to about 72 dots per inch. At that resolution, a 16-by-12-inch document fills the screen when viewed at 100 percent. If you set a higher resolution, the document shrinks on screen because the pixels are squeezed into a smaller space. Set it too high, and most documents become unreadable.

Why care if a monitor can handle more? Some applications, especially CAD programs, benefit from higher resolutions. Besides, it's nice to have a choice.

Keep in mind that if you want to run at a higher resolution, you'll need enough video memory—either built-in or on a graphics card—to handle the extra pixels. If you have an older Macintosh, you'll likely need a graphics card to take full advantage of the monitor. In addition to boosting the video memory, these cards include graphics-acceleration chips. Apple's new Power Mac G3 systems

THE Big PICTURE: 21-INCH MONITORS COMPARED

Company	Product	Mouse Rating	List Price	Contact	Viewable Area [A]	Maximum Resolution [B]	Warranty (in years) [C]	USB Hub
GENERAL-USE MONITORS								
ADI	MicroScan 6G	3½	$850	800/228-0530, www.adiusa.com	20.0	1,600 × 1,200	4	no
Apple Computer	EDITORS' CHOICE Apple Studio Display with ColorSync [D]	4	$1,499	800/795-1000, www.apple.com	19.8	1,600 × 1,200	1	yes
CTX International	EX1300	3	$1,285	800/888-9052, www.ctxintl.com	20.0	1,800 × 1,440	3 [E]	no
Eizo Nanao Technologies	FlexScan FX-E7S	3	$1,399	800/800-5202, www.eizo.com	19.7	1,280 × 1,024 [F]	3	$109
	FlexScan T960	3	$1,399	800/800-5202, www.eizo.com	9.6	1,600 × 1,200	3	yes
Hitachi NSA	RasterOps 8115	3	$999	800/906-4482, www.hitachidisplays.com	20.0	1,600 × 1,200	3	no
	RasterOps 8135	3	$1,229	800/906-4482, www.hitachidisplays.com	20.0	1,856 × 1,392	3	no
iiyama North America	VisionMaster 502	3½	$1,239	800/394-4335, www.iiyama.com	19.5	1,600 × 1,200	3	no
	VisionMaster Pro 502	3	$1,239	800/394-4335, www.iiyama.com	19.5	1,800 × 1,440	3	
Mag InnoVision	DJ920	3½	$747	800/827-3998, www.maginnovision.com	19.9	1,600 × 1,200	3	no
miro Displays	Radius Precision View XL-1	3	$1,249	650/988-7270, www.mirodisplays.com	19.7	1,600 × 1,200	3	no
Mitsubishi Display Products	Diamond Plus 100e	3	$1,099	800/843-2515, www.mitsubishi-display.com	19.7	1,600 × 1,200	3	$79
	Diamond Pro 1000e	3	$1,349	800/843-2515, www.mitsubishi-display.com	19.7	1,800 × 1,440	3	$79
	Diamond Pro 1010e	3	$1,499	800/843-2515, www.mitsubishi-display.com	19.7	1,800 × 1,440	3	$79
	EDITORS' CHOICE Diamond Pro 2020u	4	$1,499	800/843-2515, www.mitsubishi-display.com	20.0	1,800 × 1,440	3	yes
NEC Technologies	MultiSync FP1350	3	$1,499 [G]	800/632-4636, www.nectech.com	20.0	1,920 × 1,440	3	$79
	MultiSync P1250+	3	$1,099 [G]	800/632-4636, www.nectech.com	19.6	1,800 × 1,440	3	$79
Optiquest	Optiquest V115	3	$1,049	800/843-6784, www.optiquest.com	20.0	1,600 × 1,200	3	no
Panasonic Computer Peripheral Company	PanaSync E110	3½	$999	800/742-8086, www.panasonic.com	20.0	1,600 × 1,200	3	no
	PanaSync S110	3½	$1,259	800/742-8086, www.panasonic.com	20.0	1,600 × 1,200	3	no
	PanaSync/Pro P110	3	$1,399	800/742-8086, www.panasonic.com	20.0	1,600 × 1,200	3	no
Philips Consumer Electronics	Philips Brilliance 201B	3	$999	800/531-0039, www.philipsmonitors.com	20.0	1,800 × 1,350	3 [H]	$59
Princeton Graphic Systems	Princeton EO2010	3	$999	800/747-6249, www.prgr.com	20.1	1,920 × 1,440	3	no
Samsung Electronics	SyncMaster 1000s	3	$1,179	800/933-4110, www.sosimple.com	19.7	1,600 × 1,200	3	no
Sony Electronics	CPD-520GS	3	$1,049 [G]	800/352-7669, www.sel.sony.com	19.8	1,600 × 1,200	3	no
	GDM-F500	3½	$1,900 [G]	800/352-7669, www.sel.sony.com	19.8	1,800 × 1,440	3	no
ViewSonic	MB110	3½	$1,149	800/888-8583, www.viewsonic.com	20.0	1,600 × 1,200	3	yes
	P817	3	$1,849	800/888-8583, www.viewsonic.com	20.0	2,048 × 1,536	3	yes
	PT813	3	$1,295	800/888-8583, www.viewsonic.com	20.0	1,600 × 1,200	3	no
PROFESSIONAL MONITORS								
Barco Display Systems	Personal Calibrator Plus	4	$4,295	770/218-3200, www.barco.com/display/	20.0	1,600 × 1,280	2	no
	Reference Calibrator Plus	4½	$6,990	770/218-3200, www.barco.com/display/	20.0	1,800 × 1,440	2	no
LaCie	EDITORS' CHOICE electron21/108 with blue eye calibrator	4½	$1,849	503/844-4500, www.lacie.com	19.7	1,600 × 1,200	3	yes
Mitsubishi Display Products	SpectraView 1000	3½	$3,499	800/843-2515, www.mitsubishi-display.com	19.7	1,600 × 1,200	3	$79

[A] Measured diagonally, in inches. [B] In pixels. [C] For parts, CRT, and labor. [D] Evaluated as both a general-use and professional monitor. [E] Two-year CRT warranty. [F] Documentation recommends a maximum resolution of

include built-in graphics acceleration.

Refresh Rates When you spend hours staring at a computer screen, nothing is more annoying—or likely to induce headaches and eyestrain—than flickering. When a screen flickers, it means the electrons are not illuminating the phosphors quickly enough to fool your eyes—there's a tiny pause as the screen refreshes. The speed at which the electrons paint the screen is known as the *refresh rate*. To prevent screen flickering, you need a refresh rate of at least 66Hz. Most monitors offer a range of refresh rates that vary depending on the screen resolution. In our general testing, we set all the monitors at a 75Hz refresh rate, with a resolution of 1,152 by 870. All offer higher rates if necessary, although their maximum refresh rates do vary.

Comments
Acceptable quality overall, marred by stubborn moiré effects and poor controls. Very good warranty.
Excellent overall quality and a reasonable price; a great companion for new Power Mac G3s. Older Macs can't access on-screen controls. Worst warranty. For pro use: accurate hue, but too much contrast.
Acceptable overall quality, but with somewhat washed-out colors. Dimmest monitor.
Acceptable sharpness and color. Dimmer than recommended.
Acceptable color quality and sharpness, although reversed type blurry.
Acceptable overall quality, although with a slight color cast. Very bright monitor. VGA connection only.
Acceptable overall quality. Control buttons are not intuitive. Brightest monitor. VGA connection only.
General image quality acceptable, but at high resolution, the text became unreadable and image appeared to vibrate.
Acceptable overall quality. Good price for monitor with this maximum resolution.
Good bargain monitor with acceptable overall quality. Some moiré problems. Good warranty. Outstanding controls.
Acceptable sharpness and color quality. Bright monitor.
Acceptable overall quality. Good warranty.
Acceptable color quality and sharpness, but reversed type somewhat blurry. Good warranty.
Acceptable color quality and good text sharpness, but reversed text somewhat blurry. Good warranty.
Excellent sharpness, acceptable color quality, a flat screen. USB hub allows two computers to share monitor and devices.
Acceptable sharpness and color quality with slightly washed-out colors. Good warranty. Flat screen.
Acceptable color quality and good text sharpness. Good warranty.
Acceptable sharpness and color quality, although colors slightly washed out. Good warranty.
Acceptable color quality, but poor sharpness with blurry text. Good warranty.
Excellent sharpness and acceptable color quality. Good warranty.
Acceptable overall quality. Good warranty.
Acceptable sharpness and color quality. Flat screen. Good price for high resolution. Mediocre warranty.
Acceptable overall quality. Good price for high resolution, although reversed text was blurry. Good warranty.
Acceptable overall quality, but flesh tones slightly washed out. Good warranty.
Acceptable overall quality. At high resolutions, reversed text blurry. Bright monitor.
Excellent sharpness and color quality, but at a high price. Flat screen.
Acceptable color quality, but poor sharpness, with blurry text. Good warranty. Includes special speaker system.
Acceptable overall quality. Highest possible resolution, but with high price.
Excellent color quality, and acceptable sharpness. Good warranty.
Accurate, easy-to-use monitor, but expensive.
The ultimate in color accuracy, but at a very high price. Colorimeter attached to unit.
Accurate color quality at a bargain price. Good warranty. Built-in USB hub allows two computers to share monitor and devices.
Color not very accurate. Good warranty. Optional USB hub allows two computers to share monitor and devices.

80 by 1,024, although we found higher-resolution quality acceptable. [G] Estimated street price. [H] One-year CRT warranty.

Massive Monitors Compared

A monitor that looks top-of-the-line on paper can still show blurry images or faded colors when you sit down in front of it. The best way to evaluate monitors is to do your own side-by-side comparisons, so that's what our panel of experts did.

Macworld Lab lined up 33 monitors (our 29 general-use monitors as well as the 4 non-Apple professional monitors discussed in "Think Accurate") for in-depth examination. Covering the windows in the lab to eliminate extraneous outside light, we scrutinized test images designed to showcase the monitors' color quality and ability to display sharp text and graphics. We also evaluated each monitor's brightness.

A Sharper Image Whether you're crunching numbers or laying out pages in QuarkXPress, you want text and other items to appear sharp. Displayed information is always sharper in the middle of the screen and tends to get blurrier toward the edges, so our experts examined a Microsoft Excel 98 worksheet that contained normal and reversed text both in the middle and at the edges.

Overall, we found all the monitors to offer acceptable sharpness, but a few stood out as exceptional. The $1,499 Apple Studio Display with ColorSync displayed crisp text across the entire screen. The $1,499 Mitsubishi Diamond Pro 2020u also scored high for uniform sharpness. The $1,900 Sony GDM-F500 did very well with normal text, although it showed somewhat fuzzy reversed text.

On the low end of acceptable, Eizo's $1,399 FlexScan T960 and Mitsubishi's $1,349 Diamond Pro 1000e and $1,499 Diamond Pro 1010e had problems displaying reversed text, but not enough to render it illegible. The jury did find some monitors' sharpness unacceptable, however. Panasonic's $999 PanaSync E110 showed blurry, hard-to-read text, especially at the edges of the screen. ViewSonic's $1,149 MB110 also suffered from overly blurry text.

When we tested the monitors at a higher resolution—1,600 by 1,200—iiyama's $1,239 VisionMaster 502, Sony's $1,049 CPD-520GS, and ViewSonic's MB110 were the only monitors that displayed unacceptably fuzzy and unreadable text. At this resolution, Princeton's $999 Princeton EO2010 showed blurry reversed type, but not to an extent that the jury found unacceptable. One note: Eizo's

continues

Think Accurate: 5 Pro Monitors Show Their Stuff

GRAPHICS PROFESSIONALS generally want the same things from a monitor as anyone else: big or little, it should be sharp and free of distortions and shouldn't take a degree in rocket science to set up. But while most users will happily settle for a pleasing display, graphics pros who make critical color decisions need a monitor that displays color consistently and *accurately.*

Monitor accuracy isn't just a luxury anymore.

LaCie's blue eye calibrator

Direct-to-plate printing and color-management–savvy applications such as Adobe Photoshop 5 and QuarkXPress 4 have helped soft proofing (using the monitor to judge color and tone) become, if not a replacement for, then certainly a very useful adjunct to conventional hard-copy proofing. Even in situations where you're still making film and Matchprints, a well-calibrated monitor can save you from going through the multiple iterations of corrections and proofing that are commonplace in high-end prepress work.

To find out just how accurate a monitor can be, Macworld Lab tested five 21-inch models for color accuracy: the $1,499 Apple Studio Display with ColorSync, the $4,295 Barco Personal Calibrator Plus, the $6,990 Barco Reference Calibrator Plus, the $1,849 LaCie electron21/108 with blue eye calibrator, and the $3,499 Mitsubishi SpectraView 1000. We performed two sets of tests, one subjective and the other objective, to see which monitor matched colors the best.

We had hoped to include the new miro PressView XL display (miro acquired the rights to Radius's monitor line late last year). Unfortunately, no final units were available for testing. Based on past experience, we expect the PressView XL to be a serious contender. Look for an upcoming review.

How Calibration Works

Making a monitor display color accurately is as much a function of the software as it is the hardware. The main thing we ask of the hardware is that it behave consistently; that's where calibration comes in. Simply put, when you *calibrate* a monitor, you're setting it to a known state. The critical parameters are *color temperature* (usually measured in kelvins), which specifies the color of white; *white luminance* (usually measured in candelas/m^2 or footlamberts), which defines the brightness of white; *black level,* which specifies the brightness of black; and *gamma,* which expresses the overall contrast.

To display images in a consistent way, you need to calibrate the monitor to a *known* set of values for color temperature, gamma, white luminance, and black level. This will ensure that the monitor produces the same results over time. You also need a way of recording these settings, along with the color of your monitor's phosphors, in a ColorSync profile so that applications such as Photoshop 5 and QuarkXPress 4 can send the proper signals to make the color come out right on your particular monitor.

What Makes These Monitors Special

There are third-party packages that allow you to calibrate any monitor, but the five monitors we looked at come with proprietary calibration tools that offer a significant advantage over those third-party packages.

The reason? Third-party calibrators set the color temperature by changing values in a lookup table in the video card. The video lookup table contains 256 entries for each channel, corresponding to the 256 possible shades of red, green, and blue the monitor can display. The calibrators simply turn off some of these shades to arrive at the desired color temperature, which means that you lose some brightness and the monitor produces somewhat fewer than the 256 possible shades of red, green, and blue.

Instead of simply turning things down in the video card, these monitors each use a serial connection between the monitor and the host Mac that lets the calibration software apply gains in the voltage amplifiers that drive the monitor's guns. This lets the displays achieve the target color temperature without sacrificing brightness or levels.

The Serial Situation

Note that the Apple Studio Display is the only professional monitor configured to connect to the USB port in the new G3 Macs. In fact, right now it will work *only* with the new, blue Power Mac G3s. The other four monitors all require a serial port, so if you want to use one of these with the new Macs, you'll need a USB-to-serial adapter. We used Keyspan's (510/222-0131, www.keyspan.com) $79 USB Serial Adapter.

With the exception of the Apple display, our professional monitors also allow you to set a specific luminance level for both white and black, which most third-party calibrators won't do. This means that you won't overwork the monitor and will always return it to exactly the same state when you recalibrate.

Pro Monitors Compared

Calibration is, after all, about getting what you see on screen to match what you see on paper. With this in mind, Macworld Lab ran two separate color-fidelity tests to figure out which of our professional monitors did the best job.

Mitsubishi's bundled calibrator

First we went for the objective facts. We created a series of color swatches in CIELAB (a perceptually based, device-independent color space), displayed these in Photoshop, and measured the color displayed on each monitor with a Photo Research PR-703A spectroradiometer. We then compared these results with the values in the CIELAB file to see if they were the same.

Our second test addressed the subjective nature of color matching. No matter how good your equipment, it's impossible to measure *all* the colors in a nat-

ural image; in any case, what's usually most important is preserving the overall relationship between the image's colors. We asked a panel of experts, skilled in evaluating color, to judge how well a printed image on a properly lit Matchprint compared to the same image displayed on screen in Photoshop 5.

Mitsubishi SpectraView 1000 The SpectraView 1000 was the least accurate monitor in our objective test. This information was confirmed in our subjective testing. Our panel felt that it had an overall bluish-green cast, and this was borne out by the measured data. The monitor did, however, track gray levels quite well. The default calibration set the white luminance noticeably higher than any of the other monitors, which may cause the monitor to wear out more quickly. In the end, all this, combined with a price of $3,499, made us find the SpectraView disappointing.

Apple Studio Display with ColorSync Unlike the other monitors, the Apple Studio Display does not use a separate instrument to measure the light produced by the monitor. Instead, it keeps tabs on the beam current and uses an embedded processor to track phosphor aging. This innovative approach is less expensive and simpler than actually having to measure the light produced by the monitor with an instrument, but it's also probably less accurate.

In our objective tests, the Apple Studio Display reproduced hues—the property of colors that we refer to when we use a color name such as "red"—quite accurately. However, it had fairly large errors in tonal values, the lightness or darkness of the colors. A 25 percent gray, for example, was much too dark.

Our jury characterized the monitor's color quality as inviting but suffering from too much contrast, with loss of detail in both the highlight and the shadow areas. The Apple monitor—one of our Editors' Choice winners for *general use*—offers convenient calibration at a comparatively low price, but we do not recommend using it for critical image-editing tasks.

Barco's Personal Calibrator Plus measuring device

Barco Reference Calibrator Plus At $6,990, the Reference Calibrator Plus was the most expensive monitor under consideration. According to our objective tests, it was also the most accurate by far, with an average error of just one delta-e CIELAB. (One delta-e is generally reckoned to be the smallest perceptible color difference—six delta-e is usually accepted as a good commercial match in printing.)

Our jury felt that the contrast was a little flat, but it's quite likely that the jury was biased by looking at the other monitors simultaneously: the higher contrast of the LaCie was more appealing, for instance, but probably didn't match the print as accurately. The jury deemed the Barco's color rendition, sharpness, and detail excellent.

We also liked Barco's CalibratorTalk software. It offers very simple, one-button calibration (with every user-definable override you could conceivably want). The calibration instrument is stored in the monitor housing and is matched to the individual monitor at the factory. This provides unparalleled accuracy and makes it very hard to lose the instrument. (Of course, it also means you can't use the device with your other monitors.) All in all, if you want the Rolls-Royce of monitors, this is it—but it comes with a Rolls-Royce price tag.

Barco Personal Calibrator Plus The less expensive alternative is Barco's Personal Calibrator Plus. It was the second-most-accurate monitor in our objective test, slightly ahead of the LaCie. One of our jurors felt that the monitor had a slight bluish cast and that it displayed a little less highlight detail than the Reference Calibrator Plus, but the jury generally rated it highly.

The Personal Calibrator Plus comes with the same CalibratorTalk software as its more expensive sibling and includes a simple measuring puck from Sequel Instruments. CalibratorTalk supports other instruments, too, and discussions with a Barco representative suggest that using CalibratorTalk with a better instrument—such as the $495 X-RiteColor DTP92 Monitor Optimizer, from X-Rite (888/826-3059, www.x-rite.com)—could improve accuracy.

LaCie electron21/108 with blue eye calibrator Although we liked the Personal Calibrator Plus, which costs $2,695 less than the Reference Calibrator Plus, at a mere $1,849 LaCie's electron21/108 was the *clear* price/performance winner in this group.

The electron21/108 displayed slightly more hue error in our objective tests than did the Apple monitor, but it tracked gray values much more accurately, particularly in the shadows. Our jury preferred it over all the other monitors for overall contrast and color, perhaps in part because of its flat screen. Our only real complaint about the electron21/108 is its dark-blue plastic casing, which introduces extraneous color that can skew the viewer's perception.

LaCie's software is particularly elegant, with one-button calibration and intuitive control over all monitor settings. The only thing the software doesn't do is automatically set the ColorSync profile it creates as the System Profile. Overall, however, this monitor is a deal. It wins on price, performance, and ease of use.

Macworld's Buying Advice

If you want the absolute best and don't mind paying for it, Barco's Reference Calibrator Plus is state-of-the-art. The Personal Calibrator Plus comes in a close second. However, if you're concerned about money, as most of us are, LaCie's electron21/108 with blue eye calibrator delivers very impressive performance at a hitherto undreamed-of price.

One thing to note is that the Barco monitors' target luminance is quite a bit lower than that of the LaCie monitor. This means that to get the full benefit of the Barco calibration, you need to use those monitors in a very low ambient-light setting. The CalibratorTalk software does allow you to choose a higher target brightness, but doing so will shorten the life of the display. The electron21/108's greater brightness makes it more tolerant of higher ambient light. You really can't go very wrong with any of our top three monitors. Your color will be more predictable, you'll save money by eliminating multiple iterations of proofing, and you'll have far fewer surprises at print time.

Contributing Editor BRUCE FRASER is a coauthor of *Real World Photoshop 5* (Peachpit Press, 1999).

EDITORS' CHOICE

Best Professional Display

LaCie electron21/108 with blue eye calibrator This inexpensive calibrated monitor offers impressive color accuracy and ease of use. Company: LaCie (503/844-4500, www.lacie.com). List price: $1,849.

REAL PRODUCTS REAL RATINGS

Reviews you can trust *Macworld* rates only final shipping products, not prototypes. What we review is what you can actually buy

Think Big

continued from page 83

$1,399 FlexScan FX-E7S documentation recommends using a maximum resolution of 1,280 by 1,024 with this monitor. However, we found that the monitor's quality did not suffer when resolution was set to 1,600 by 1,200.

The Right Color While these monitors are not intended for color proofing (see "Think Accurate"), colors should still be rich and realistic. If you're shopping for sweaters on the Web, after all, you want to know if that cardigan is actually green or turquoise. To test the monitors' color-display capabilities, our experts examined an Adobe Photoshop image that included the hardest things to get right: an array of primary colors, flesh tones, and solid blacks.

Mitsubishi's Diamond Pro 2020u

Two of the monitors that scored best on sharpness—the Apple Studio Display and the Sony GDM-F500—also led the pack in color reproduction, with accurate colors, realistic flesh tones, and dark blacks. ViewSonic's $1,295 PT813 also excelled, with rich colors and dark blacks, although it did show poor contrast between areas of similar color.

None of the monitors drew an unacceptable rating for color reproduction, but some did have quirks. CTX's $1,285 EX1300, Optiquest's $1,049 V115, Samsung's $1,179 SyncMaster 1000s, and NEC's $1,099 MultiSync P1250+ suffered from somewhat faded, washed-out colors. Hitachi's $999 RasterOps 8115 showed a slight color cast.

Bright Subjects Some monitors are brighter than others, a factor that comes into play if you work in a well-lit environment. Under fluorescent lights, a monitor projecting about 20 to 23 footlamberts—the standard measurement for brightness—is sufficient for most people. In a less ideal setting you may need a brighter display. For example, if you sit by a window, a bright monitor will be able to compensate for the direct light.

To test brightness, we cranked up each monitor's contrast to the maximum level and adjusted the brightness control to ensure consistent results. We then measured luminance, using a Minolta color analyzer.

Hitachi's $1,229 RasterOps 8135 and the aforementioned RasterOps 8115

Macworld LAB TEST

The Eyes Have It

Rich, realistic colors. Crisp, sharp text. Would you expect less from the monitor you stare at day after day? Our panel of experts examined 29 big monitors for just these qualities, but only a few stood out from a generally acceptable crowd. The Apple Studio Display with ColorSync and the Sony GDM-F500 were the only monitors to get top scores for *both* color quality and sharpness. The Mitsubishi Diamond Pro 2020u and the Panasonic PanaSync S110 scored high for sharpness (the most essential quality for text), but their color quality was flatter. Brightness scores above 20 footlamberts are best.

Best results in red.

		SUBJECTIVE IMAGE QUALITY		
	Brightness*	Color Quality	Sharpness	High-Resolution Sharpness
ADI MicroScan 6G	19.8	Fair	Fair	Fair
★ Apple Studio Display with ColorSync	20.6	Excellent	Excellent	Fair
CTX EX1300	18.0	Fair	Fair	Fair
Eizo FlexScan FX-E7S	18.4	Fair	Fair	Fair
Eizo FlexScan T960	21.1	Fair	Fair	Fair
Hitachi RasterOps 8115	29.1	Fair	Fair	Fair
Hitachi RasterOps 8135	30.7	Fair	Fair	Fair
iiyama VisionMaster 502	26.6	Fair	Fair	Poor
iiyama VisionMaster Pro 502	24.7	Fair	Fair	Fair
Mag InnoVision DJ920	20.3	Fair	Fair	Fair
miro Radius Precision View XL-1	28.5	Fair	Fair	Fair
Mitsubishi Diamond Plus 100e	22.9	Fair	Fair	Fair
Mitsubishi Diamond Pro 1000e	21.0	Fair	Fair	Fair
Mitsubishi Diamond Pro 1010e	20.1	Fair	Fair	Fair
★ Mitsubishi Diamond Pro 2020u	23.0	Fair	Excellent	Fair
NEC MultiSync FP1350	25.0	Fair	Fair	Fair
NEC MultiSync P1250+	24.5	Fair	Fair	Fair
Optiquest V115	23.1	Fair	Fair	Fair
Panasonic PanaSync E110	23.0	Fair	Poor	Fair
Panasonic PanaSync S110	21.0	Fair	Excellent	Fair
Panasonic PanaSync/Pro P110	19.1	Fair	Fair	Fair
Philips Brilliance 201B	20.8	Fair	Fair	Fair
Princeton EO2010	21.8	Fair	Fair	Fair
Samsung SyncMaster 1000s	25.8	Fair	Fair	Fair
Sony CPD-520GS	28.5	Fair	Fair	Poor
Sony GDM-F500	21.1	Excellent	Excellent	Fair
ViewSonic MB110	25.8	Fair	Poor	Poor
ViewSonic P817	28.2	Fair	Fair	Fair
ViewSonic PT813	25.5	Excellent	Fair	Fair

★ = EDITORS' CHOICE * *Results in footlamberts.*

Behind Our Tests

To test the image quality, Macworld Lab used a jury of three experts. Monitors were connected to iXMicro ix3D Pro Rez display cards and set to a resolution of 1,152 by 870 for general image-quality testing and 1,600 by 1,200 for the High-Resolution Sharpness test. The jury examined test images from Adobe Photoshop and Microsoft Excel and tested display brightness using a Minolta TV-2150 color analyzer. Brightness was measured at the optimally adjusted brightness and contrast settings.—**Macworld Lab testing supervised by Jeffy K. Milstead**

stood out as the brightest monitors, measuring 30.7 and 29.1 footlamberts, respectively. Sony's CPD-520GS and miro's $1,249 Radius Precision View XL-1 came in a close third, producing 28.5 footlamberts. Only a few monitors fell notably below the ideal range for brightness, including CTX's EX1300 at 18.0 footlamberts, Eizo's FlexScan FX-E7S at 18.4 footlamberts, and Panasonic's $1,399 PanaSync/Pro P110 at 19.1 footlamberts.

Moiré Display If you see an annoying wavy distortion on your screen, especially when viewing intricate detail, it may be a *moiré effect*, which is often caused by interference from patterns that are close to the same frequency as the monitor's dot pitch.

In our testing, several of the shadow-mask CRTs displayed moiré effects. In almost all cases, these distortions disappeared when we tweaked on-screen moiré controls. However, even after taking this step, we were unable to get rid of noticeable distortions (visible even in solid colors) in ADI's $850 MicroScan 6G. To a much lesser extent, Mag InnoVision's $747 DJ920 also suffered from some subtle but stubborn distortion.

Compared with glare-prone curved screens (right), the new flat screens (left) generally do improve image quality.

Keeping Things under Control

Even if annoying moiré effects aren't a problem, you'll probably want to experiment with monitor settings to get the picture most pleasing to your eye. All of the monitors we evaluated sported easy-access brightness and contrast controls along with on-screen menu systems that let you adjust horizontal and vertical scaling, panning, and other settings you may need to modify from time to time. Not all menu systems are created equal, however.

The Mag InnoVision DJ920 and the $999 Philips Brilliance 201B use intuitive circular controls to help you navigate the menu system. Most of the other models employ a four-button method—one for menu, navigate right, navigate left, and exit—which we also found easy to use. ADI's MicroScan 6G had the least intuitive controls. This monitor sports a whopping 14 buttons, not including the power switch, which means it's a lot easier to inadvertently change the wrong settings.

A Control Conundrum The Apple Studio Display's controls are almost entirely on screen; the monitor uses software-based on-screen controls that require a USB connection between the monitor and computer. As a result, Apple has certified the display to work *only with the new, blue Power Mac G3s*, which include built-in USB ports.

We tried connecting the monitor to an early Power Mac G3 using a USB PCI card, but the software controls failed to work. In theory, you should be able to use the monitor with any Power Mac, but be forewarned: without on-screen controls, you'll be limited to adjusting only brightness and contrast.

USB Flexibility The Apple Studio Display's unusual USB setup may reduce its flexibility, but some of the displays in our roundup offer built-in (or optional) USB hubs that *expand* their flexibility.

We were particularly impressed by Mitsubishi's USB hub, which is a $79 option for most of the company's monitors but is built into the Diamond Pro 2020u. Unlike other companies' hubs, Mitsubishi's allows you to hook up *two* computers to your monitor. This means the computers can share a keyboard, pointing device, and other USB peripherals—a rare convenience, especially for people who use both a Mac and a PC.

Macworld's Buying Advice

Two monitors displayed overall quality that made them stand out from the pack: the Apple Studio Display and the Sony GDM-F500. Both these monitors offer excellent sharpness as well as rich, saturated, and accurate color that is noticeably a step above the rest. The GDM-F500 has a better warranty than the Apple monitor, has a flat screen, and works with any Mac, but it also costs $400 more. For this reason, the Apple Studio Display is our Editors' Choice for people who own, or are about to buy, a new blue Apple G3.

If you own an older Mac, we recommend Mitsubishi's Diamond Pro 2020u. This monitor is priced identically to the Apple Studio Display and offers superb sharpness, a flat screen, and acceptable—if not excellent—color quality. The unusual flexibility offered by the Diamond Pro's special USB hub also helped us give it the nod as our second Editors' Choice. If color quality is paramount and money is no object, the Sony GDM-F500 is also a solid choice.

Get ready to stretch out and open that spreadsheet. You'll see it all—your 30-year business plan from column A through column Z. So now how does it all add up? **m**

Macworld's Senior Editor/News and Reviews STEPHEN BEALE covers the graphics and imaging beats. Assistant Editor MICHAEL GOWAN wouldn't mind having a bigger monitor one bit.

EDITORS' CHOICE

Best Display for New Macs

Apple Studio Display with ColorSync This reasonably priced monitor offers outstanding overall quality, but it works fully only with new Apple G3s and has a less-than-ideal warranty. **Company:** Apple Computer (800/795-1000, www.apple.com). **List price:** $1,499.

Best Display for Older Macs

Mitsubishi Diamond Pro 2020u This monitor offers excellent sharpness; a flat, glare-free screen; and acceptable color quality. Its special USB hub also makes it ideal if you use two computers. **Company:** Mitsubishi Display Products (800/343-2515, www.mitsubishi-display.com). **List price:** $1,499.

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9:05 am
Read and reply to your 52 email messages.

10:14 am
Check your stock portfolio online.

10:24 am
Write 2-page proposal for your boss.

11:21 am
Crunch numbers for budget reforecast.

12:45 pm
Eat lunch at your desk. Check favorite online chat room.

1:52 pm
Scan and retouch photo for 2-page spread.

3:01 pm
Finish building corporate intranet site.

4:12 pm
Catch up on daily Macintosh news at www.macweek.com.

4:32 pm
Play networked game of Quake II with 17-year old in Boise, Idaho.

For the "online reading, eye-strained, blurry-visioned" Mac professional.

Your eyes. Windows to the soul. Or if you're a Web surfer, victims of torture. After all, you spend most of the work day staring at your monitor. Reading. Writing. Scanning. Surfing. Gaming.

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WEB MERCHANT'S COMPANION

Everything You Need to Know BEFORE You Set Up Shop Online

If you own a business, the seductive call of online profits has become nearly irresistible. You just *know* you'll be able to increase sales and boost profits if you can only sell your products to the zillions of hungry consumers out there on the Internet. If you're a Web-site designer, hardly a day goes by when you're not asked to help a client get online.

But is setting up shop online *always* a good idea? And what are the hurdles to getting into the electronic marketplace? To answer these questions, you'll need to know more about electronic commerce, or *e-commerce*, and about the different ways you can put a store on the Net. There are many roads to online commerce—although like most roads, this one has a few potholes along the way.

PART 2

by Tom Negrino

How Does E-commerce Work?

If you've ever ordered anything over the Internet, you're familiar with the process. First, you find a site that has the product you want to buy. Next, you browse the store until you find what you want, and then you click on the Order button. That click stores the item you've chosen in an electronic shopping cart.

When you're done shopping, you proceed to the checkout area, which accepts your personal information and your credit card number. You shouldn't have to worry about the security of your credit card information, as any reputable e-commerce site will have a *secure server*—a Web server that works with your Web browser to encrypt the order.

Seller's Essentials As the seller in an e-commerce transaction, you have a different set of concerns. To set up shop on the Internet, you need a commerce-enabled Web site, which includes the electronic shopping cart; a connection to the credit card network; and finally, a *merchant account*, which allows funds received from credit card transactions to be deposited to your business's checking account.

The biggest hurdle, especially if you are just starting out in business, is getting a merchant account, which usually requires credit checks and application fees. The connection to the credit card network is either software for your Mac or a card-reading machine that connects to the authorization network via a modem. If most of your sales will be over the Net or via mail order, you don't need the machine—just your Mac, a modem, and the software.

The most common authorization software is Tellan Software's (800/483-5526, www.tellan.com) MacAuthorize, which costs about $800. Exact pricing varies because the bank or other company that helps you obtain your merchant account usually sells or leases the program as part of a multiyear contract for credit card authorization services. That same company (which could be your bank) will also take a percentage (between 1.6 and 3.0 percent) of each sale, may charge a small fee (under 50 cents) per transaction, and may charge minimum monthly service fees.

Is E-commerce for You?

Just as with opening a store in the physical world, you should evaluate the risks in e-commerce before jumping in. First, figure out how much business you need to make your Web store worth running. That will depend on the amount of your average order and your expenses each month for Web hosting and other necessities. Don't forget to add in the value of your time, as you'll need to work at updating your online store, just as you would spend time stocking the shelves in a physical storefront. Because online stores usually start out with small sales numbers (see the sidebar, "Making It Online"), in general, if you need more than a few sales per month to break even, you should rethink your business plan.

Credit card fraud, while rare, does happen, and the ugly reality is that if you ship an order based on a stolen card, you'll end up losing the goods you shipped, *and* the credit card company will charge you back for the order's amount—a double insult. You can protect yourself from fraud by contacting the customer before shipping orders that look suspicious and asking for more information, such as the name of the bank that issued the credit card, and by always requiring a signature for shipped products.

Getting Started If you do take the plunge, there are three basic ways to get your store online. You can build your own Mac-based e-commerce server and keep the whole shebang entirely in-house. There are shopping-cart services you can tie into a Web site you create yourself. And there are companies that will help you create your online store from scratch and will host and run the store to boot.

Roll Your Own E-commerce Server

If you want to create your own server, the Mac is up to the task. In terms of performance, you have nothing to worry about; because Web serving isn't a CPU-intensive task, any Power Macintosh can easily handle thousands of hits and hundreds of orders per day. You'll need a PowerPC Mac (an iMac will do

MAKING IT ONLINE

BEING SUCCESSFUL IN ONLINE RETAILING requires a different mind-set from operating a traditional storefront. A store in the real world has a predictable sales pattern; sales ramp up after the store's opening as customers get to know it, and then plateau when the store has saturated the demand in the local market. Because an online store has no local market (it's just as easy to go to one place as to another on the Internet), the online retailer can't count on window-shoppers to happen by the store. That's why so many of the so-called online malls have failed. There's no compelling reason for shoppers to go to an online mall and browse around the stores. Yahoo's shopping site expects to succeed because people are already coming to Yahoo for other reasons, such as to find things on the Web, check their free e-mail, get news, or use Yahoo's other portal services.

So *what* you sell, rather than where you sell it, is the primary indicator of your possible success as an online retailer. Making your Web site *the* place to buy a particular item is essential, because it's so easy for customers to buy from any other store. The key is to pick a small niche you can dominate. If you make or sell something people really want and can't get anywhere else, you have a good chance of online success.

It's foolish to try to compete with big, established Web merchants on their own turf. Chances are minuscule that you're going to beat Amazon.com at selling books. Paul Graham, producer of the Yahoo Store, puts it this way: "Would your product sell and your store prosper in the real world if it was right next door to a Wal-Mart? If so, there's a good chance that you'll make it online."

PREVIOUS PAGE: PHOTOGRAPHY BY MARK JOHANN / BACKGROUND IMAGE FPG

just fine, or if you have an older computer sitting around, you can press it into service) with an Ethernet connection, a decent amount of RAM (say, 40MB), and at least 1GB of free disk space. You'll need Web server software such as StarNine's WebStar ($499; 800/525-2580, www.starnine.com) or Tenon Intersystems' WebTen ($495; 800/662-2410, www.tenon.com). You'll also want Sophisticated Circuits' (800/769-3773, www.sophisticated.com) Rebound (for ADB Macs; $99) or Kick-off (for USB Macs; $199) devices, which automatically restart the server if the Mac crashes.

For the shopping-cart software, you have two good choices: the first is the $495 Ch-Ching from Imagination Software (800/244-5332, www.imagination.com), a FileMaker Pro–based shopping cart with built-in credit card authorization abilities. It requires Blue World Communications' $548 Lasso (425/646-0288, www.blueworld.com) in order to work with WebStar. For customization, you'll want a copy of the $199 FileMaker Pro (800/986-2249, www.filemaker.com). Your other choice of shopping carts is Pacific Coast Software's $3,395 WebCatalog-WebMerchant bundle (619/675-1106, www.pacific-coast.com), which also requires that you buy MacAuthorize.

Getting Started After you have bought the hardware and software, you can get started building your Web site and online store. Both Ch-Ching and WebCatalog offer templates that will get a store on the Net quickly, but you'll probably want to customize the look-and-feel of the templates to match your site. For that customization you need some skills in HTML and (if you're using Ch-Ching) FileMaker Pro. When you've built your store, you should expect to pay anywhere from $50 to $400 a month for high-speed, continuous Internet access.

As you can see in the table, "An E-commerce Price List," the start-up costs—in money, time, and expertise—for having your own server are quite high. The most compelling reason for making this commitment is that you want and need every bit of control and customization you can wring out of your site. As such, it probably isn't the solution for most small businesses.

Yahoo! Profits! The Yahoo Store's Web-based interface lets you design and modify the appearance of your shopping site.

HOSTING YOUR OWN E-COMMERCE SITE

The Good Gives you the most control over and complete customization of your online store.

The Bad You have to learn how to create that control and customization, or pay someone else to do it.

The Ugly Costs the most money and time up front, and you are entirely responsible for 24-hour maintenance of the server.

Step Into a Store's Service

Perhaps the easiest way to get online is to use one of the online store services, such as Yahoo Store (http://store.yahoo.com) or iCat Commerce Online (www.icatcorp.com). Rather than grafting a shopping cart onto your existing site, these services let you build entire stores based on templates, using nothing more than a Web browser. You don't have to run your own server, and this method doesn't require any HTML knowledge, although if you want a really spiffy-looking store you'll probably want to use at least a little HTML. The price is right, too: Yahoo Store

Hook Up a Shopping Cart

If you already have an established Web site hosted by an Internet service provider, you can add e-commerce to it by either buying an off-the-shelf shopping-cart package and having your ISP install it on the ISP's server, or tying your site to a shopping-cart service. Many companies offer these services, often rented by the month for prices ranging from free to about $100, with few or no setup fees. Because these carts run as programs on the host's Web servers, you'll usually need to insert into your site's pages some specialized HTML code that calls the cart program. This task isn't generally too daunting, but you should check with the ISP to see just how much modification of your pages it will require.

Some carts, such as CheckItOut (978/440-9988, www.adgrafix.com), generate a whole store for you, even allowing you to upload images for your store's items and to customize the look of the store to some extent. Other carts, such as Americart (www.americart.com), require extensive modification of their HTML templates to get anything to work. Things you want to look for when you choose a shopping cart include the ability to calculate shipping methods and sales taxes flexibly; automatic mathematical verification of credit card numbers; automatic e-mail order confirmations; and most of all, simplicity in the ordering process. Customers won't put up with complex procedures or with systems that require elaborate registration before allowing an order to go through.

USING SHOPPING-CART SOFTWARE

The Good Fairly low cost; many options from which to choose; good add-on to an existing site.

The Bad Limited customization; HTML skills often required; some carts charge per-transaction fees.

The Ugly Serious research required to make sure shopping cart meets your needs; feature set may not grow as your store does.

charges $100 per month for a secure store with real-time credit card authorization and up to 50 items, and iCat costs even less, beginning with free, 10-item stores, although it won't do the authorization.

Both services say you can build a store in just a few minutes, and it's true; it's just that the result is not too aesthetically pleasing. You can use the Yahoo and iCat tools to create an attractive store, but it will take a reasonable amount of work and experimentation. You can upload your own logo, as well as images of all the products you sell, to either store. Yahoo Store automatically makes thumbnails of large images, and it even lets you download order information in Microsoft Excel format.

Besides building stores, we also tried buying from stores that use each service. The Yahoo stores worked well; the pages loaded quickly, and it was easy to go through the checkout process. Unfortunately, we had many problems with iCat's stores. As consumers, we put items in the shopping cart, only to be told later that the cart was empty and that we should call tech support. When we tried to build a store, iCat demanded a credit card number, even though we were building a free store.

SETTING UP SHOP IN SOMEONE ELSE'S STORE

The Good Very reasonable cost for small stores; usually requires no HTML skills; chock-full of features.

The Bad Costs are usually tied to the number of items you're selling; limited customization.

The Ugly In our experience, some of the software didn't work at all. Try before you buy, or make sure you can get a refund if you're not satisfied.

The Last Word

Before you start worrying about the technical problems involved in creating an Internet store, it's important that you make a strong case businesswise for selling your products online. You'll need to spend a considerable amount of time and effort to make your online venture successful, so make sure you're ready to learn the ropes and have considered the risks.

Until recently, the barrier to getting your business to sell online was fairly high, especially if you wanted to use a Mac-based server. E-commerce on the Mac meant a serious amount of programming and fiddling with custom databases, and often required specially written scripts in AppleScript or Frontier to get the shopping cart and databases to exchange data with MacAuthorize. The advent of newer products like Ch-Ching has greatly reduced the need for customization. Still, running your own server makes financial sense only if you need the tightest control over the operation and the look of your online store.

If you already have a Web site hosted on someone else's server, you should definitely look into adding a shopping cart to your site. Costs in terms of both time and money are low. But for the most convenience and bang for the buck, Yahoo Store deserves your serious attention. Besides being just a click away from the Web's most heavily visited site, Yahoo Store makes it easy to create, maintain, and manage good-looking stores that don't skimp on features. **m**

Contributing Editor TOM NEGRINO is the author of *Microsoft Office 98 for Macs for Dummies* (IDG Books Worldwide, 1998) and a coauthor of *JavaScript: Visual QuickStart Guide*, third edition (Peachpit Press, 1999).

AN E-COMMERCE PRICE LIST

THERE ARE ALWAYS COSTS INVOLVED IN MARKETING, AND selling on the Internet is no exception. We compared three e-commerce solutions to estimate start-up and ongoing costs.

For the Mac-based server, we calculated the price of an iMac running WebStar, with the combination of Ch-Ching, FileMaker Pro, and Lasso. This setup allows you to handle hundreds of orders a day and sell thousands of different items. The shopping-cart solution (CheckItOut) allows 25 items in your store; the hosted store (the Yahoo Store) allows 50 items. You can add up to 1,000 items to the Yahoo Store for $300 per month; to expand the CheckItOut store, you must buy the software for $500.

We estimated a monthly cost for each option by assuming each made 50 sales in one month at $75 each. Then we applied the fees and charges most likely to apply, based on a survey of many merchant account providers. Because the monthly costs, other than the discount rate and the transaction fees, are fixed, the more sales you make, the lower your cost per sale. The high cost of the Mac server makes it appropriate only if your sales volume will recoup the costs. The shopping cart is an attractive service, but the store is small and you have to do all the work to attract visitors. The Yahoo Store costs a bit more per month, but the quality of the shopping cart, the listing in Yahoo's shopping area, and the increased size of the store make it the best deal.

	Dedicated Server	Shopping Cart (CheckItOut)	Hosted Store (Yahoo Store)
START-UP COSTS			
Hardware	$1,398.00	NA	NA
Software	$2,131.00	$40.00 [A]	$40.00 [A]
Internet service provider start-up	$200.00	0.00	$0.00
Domain registration	$70.00	$70.00	$70.00
Banking/merchant account fees [B]	$125.00	$125.00	$125.00
Total Start-up Costs	**$3,924.00**	**$235.00**	**$235.00**
MONTHLY FEES			
Server space and connectivity	$300.00 [C]	$39.00	$100.00
Merchant account statement fee	$25.00	$25.00	$25.00
Lease for authorization software	$0.00	$40.00	$40.00
Discount rate [D]	$93.75	$93.75	$93.75
Per-transaction charges [E]	$15.00	$15.00	$15.00
Total Monthly Fees	**$433.75**	**$212.75**	**$273.75**
Cost per sale	$8.68	$4.26	$5.48

NA = not applicable. [A] For cart and store, reflects first-month authorization-software lease payment. [B] Average application fee, based on survey of many different merchant account sites. [C] Fee to maintain server at Internet service provider. [D] Based on 2.25 percent discount rate of gross sales. [E] Based on $.30 per transaction.

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Steve Jobs, Apple Computer, Inc., Interim CEO, July 21, 1999

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- **Advanced Techniques** - Go inside me of the hottest Macintosh technologies in e Advanced Techniques Track and discover ays to extend the platform and make it work r you more powerfully than ever before.
- **Color** - Learn the basics of color theory nd deployment of Apple's ColorSync technolo- y; see how creative content designers are pro- ding their customers precise color accuracy in eir proofing and finished products.
- **PDF** - Attend sessions in this Portable ocument Format (PDF) track to gain an n-depth understanding of how to successfully eploy PDF, work around it's limitations and aximize its potential.
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- ***Macworld* Magazine Presents** - *Macworld's* editors, columnists and featured guest speakers present the hottest topics straight off the pages of the industry's premier publication.
- **Macs in Education** - The Macintosh paradigm for computing ease-of-use has made it the platform of choice for educators world-wide. This track showcases innovative applications and techniques that can enhance both learning and teaching opportunities.
- **Goodies** - These presentations and ideas will put a smile on your face and demonstrate things that are cool for cool's sake. Join fellow members of the Macintosh community as we celebrate technology in this wild, weird and wonderful track.

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Early Discount Registration Form for MACWORLD Expo/New York 199

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Choose your package and fill out the form completely. Incomplete forms will be returned unprocessed. Please use one form per person; make photocopies for additional people.

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title

company

street address (please include apt #, suite, mail stop, etc.)

PRIORITY C

P.O. box (if applicable)

city | state | zip code

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2 Registration Package Selection & Fees

Town Meeting and Pre-Conference Workshops: July 20, 1999 ● Conference Sessions and Exhibits: July 21-23, 1999. All Conference Sessions, Keynote Address and the Town Meeting are on a first-come, first-served basis with the exception of the Pre-Conference Workshops.

		Early Discount by June 21	Regular Price after June 21
W write in your workshop session code	❑ **Package 1: SUPER PASS** Includes: Pre-Conference Workshops, Macworld/Pro Conference Sessions, MACWORLD Expo Users Conference Sessions, Keynote Address, Exhibits, Town Meeting	$1,095	$1,195
	❑ **Package 2: Macworld/Pro Conference** Includes: Macworld/Pro Conference Sessions, MACWORLD Expo Users Conference Sessions, Keynote Address, Exhibits, Town Meeting	$795	$845
W write in your workshop session code	❑ **Package 3: MACWORLD Expo Users Conference & Full-Day Pre-Conference Workshop** Includes: Pre-Conference Workshop, MACWORLD Expo Users Conference Sessions, Keynote Address, Exhibits, Town Meeting	$515	$565
W write in your workshop session code	❑ **Package 4: Full-Day Pre-Conference Workshop** Includes: Pre-Conference Workshop, Keynote Address, Exhibits, Town Meeting	$395	445
	❑ **Package 5: MACWORLD Expo Users Conference** Includes: MACWORLD Expo Users Conference Sessions, Keynote Address, Exhibits, Town Meeting	$195	$225
	❑ **Package 6: Exhibits ONLY** Includes: Admission to the exhibits ONLY. Does NOT include admission to the Keynote Address.	$29	$45

3 Attendee Profile (must be filled out to process your registration)

For What Purpose Are You Purchasing/ Evaluating Products and Services?
- ❑ 1. For my Company/Organization/Department
- ❑ 2. For Mysell as a Consultant/Sole Proprietor
- ❑ 3. For Myself as Consumer

What is Your Industry? (CHECK ONE ONLY)
- ❑ 4. Accounting/Finance
- ❑ 5. Aerospace
- ❑ 6. Architecture/Construction/Process Industries
- ❑ 7. Art/Design/Creative Services
- ❑ 8. Arts & Entertainment
- ❑ 9. Computer Reseller/VAR/VAD/Service
- ❑ 10. Consulting
- ❑ 11. Education: K-12
- ❑ 12. Education: Higher Ed
- ❑ 13. Education: Other
- ❑ 14. Engineering/R&D
- ❑ 15. Gaming
- ❑ 16. Government/Military
- ❑ 17. Health/Medical Services
- ❑ 18. Legal Services
- ❑ 19. Manufacturing (Computer Industry)
- ❑ 20. Manufacturing (Non-Computer Industry)
- ❑ 21. Marketing/Sales/PR/Communications
- ❑ 22. Printing/Publishing
- ❑ 23. Transportation
- ❑ 24. Utilities
- ❑ 25. Other_____

What is Your Job Function? (CHECK ONE ONLY)
- ❑ 26. Art Director/Graphics
- ❑ 27. Consultant
- ❑ 28. Controller/Treasurer/Accounting/CFO
- ❑ 29. Corporate Executive
- ❑ 30. DP/IS Management/CIO
- ❑ 31. Editorial/Writing
- ❑ 32. Educator
- ❑ 33. Engineering/Scientific/R&D
- ❑ 34. Human Resources
- ❑ 35. Management/Department Head
- ❑ 36. Marketing/Sales
- ❑ 37. Network Management
- ❑ 38. Professional (Lawyer, Doctor, etc.)
- ❑ 39. Programming/Analysis
- ❑ 40. Purchasing
- ❑ 41. Software Developer
- ❑ 42. Training
- ❑ 43. Other _____

What is the size of your Organization?
- ❑ 44. Under 50
- ❑ 45. 50-99
- ❑ 46. 100-499
- ❑ 47. 500-999
- ❑ 48. 1000 & Over

Which Personal Computers Do You Use? (Check all that Apply)
- ❑ 49. Macintosh Powerbook Series
- ❑ 50. Macintosh Performa Series
- ❑ 51. Macintosh Quadra Series
- ❑ 52. Macintosh Workgroup Series
- ❑ 53. PowerMac
- ❑ 54. iMac
- ❑ 55. PowerMac G3
- ❑ 56. PowerBook G3
- ❑ 57. IBM PC or Compatible Desktop
- ❑ 58. IBM Laptop/Notebook
- ❑ 59. Other _____

Are the Computers at Your Organization Networked?
- ❑ 60. Yes
- ❑ 61. No

4 Payment Method (You will be charged for all registrations received including duplicates.)

Payment must accompany form for registration to be complete. DON'T PAY FOR THIS EVENT TWICE! You will be charged for all registrations received and will not be refunded for duplicate registrations. Please use one method of registration only. **All Registration fees are non-refundable and credentials are non-transferable.** A $20 fee will be charged for all returned checks. Purchase orders will not be accepted.

❑ Check enclosed (make payable to MACWORLD Expo). Enclose both check and registration form in envelope.

❑ MasterCard ❑ Visa ❑ American Express Amount $ _____

Account Number _____ Expiration Date _____

If Card Holder is other than registrant, please print card holder's name below:

first name | m.i. | last name

5 Pre-Conference Workshop Key and Registration Information

WORKSHOP KEY:
Tuesday, July 20: 12:00 p.m. - 7:00 p.m.
- **WA:** Practical Introduction to Mac Networking
- **WB:** Desktop Publishing: The Big Picture
- **WC:** Creation of High Quality Photographic Web Cont
- **WD:** Macintosh Network Administration with the Ap Network Administrators
- **WE:** The QuickTime™! Professionals Workshop
- **WF:** How to be a Mac Power User
- **WG:** Getting Started with Applescript
- **WH:** An Introduction to WebObjects Development
- **WI:** Java Script and Dynamic HTML Wizardry
- **WJ:** Macintosh Audio Solutions for Real World Challen

Workshops are subject to change, please visit the Web at www.macworldexpo.co for the most up-to-date information.

REGISTER NOW!
Use ONE of the following methods to register with this fo

WEB: www.macworldexpo.com THROUGH 7/14/99. Registrations received after 6/2199 will be charged at regular pricing.

PHONE: 800-645-EXPO or 781-551-9800 outside the U.S. ($5 service fee does apply) THROUGH 7/14/99. Registrations received after 6/21/99 will b charged at regular pricing.

MAIL TO: MACWORLD Expo/New York P.O. Box 9103, Norwood, MA 02062-9103. THROUGH 6/21 ONLY.

FAX: 781-440-0359. Faxed registration form must inc credit card information THROUGH 6/21/99 ONLY.

BADGE INFORMATION
- Confirmation of registration will be sent once registration is processed.
- U.S. badges will be mailed after 7/5/99 for registrations received by 6/21/99.
- All international (including Canadian) attendees must up badges on-site at the On-site Badge Pick-up cour
- If you register between 6/21/99 and 7/14/99 you mu pick-up your badge on-site at the On-site Badge Pick- counter located in the Southside of Crystal Palace.
- On-site Registration/Badge Pick-up Hours:
  July 19: 2:00 p.m. - 6:00 p.m.
  July 20-22: 8:00 a.m. - 6:00 p.m.
  July 23: 8:00 a.m. - 4.00 p.m.

Secrets

Common Problems, Affordable Fixes

GREAT SHAREWARE TO TACKLE SMALL BUT IRRITATING DIFFICULTIES ON YOUR MAC

by Ted Landau

Shareware authors take on problems commercial developers often consider too small to worry about—yet these problems can be widespread and extremely annoying. Here's a list of some of the most common problems that bother Mac users, as well as the right shareware utility to fix each one. You can download the shareware from online sites such as MacFixIt (www.macfixit.com/library.shtml) and the Macworld Online shareware library (www.macdownload.com).

How Do I Quit Nothing?

"I get an error message that says I can't do some task until I close all applications. However, when I check the Application menu, it lists nothing besides the Finder. What's going on?"

Use Peek-a-Boo. You're probably running a background (or *faceless*) application. This hybrid, which is halfway between standard applications and extensions, may be open even though the Application menu doesn't list it. Fortunately, there are utilities that list all open *processes* (a generic term for both background and ordinary applications) and let you quit them. My favorite is Peek-a-Boo (Clarkwood Software; $20).

Peek-a-Boo not only lists all open applications but also displays the percentage of time your processor spends with each open program (see "Reveal All"). This can help you spot processor hogs that may be slowing down your Mac. You can choose to quit the hog or use Peek-a-Boo to change its priority ranking. Setting an application's priority to low causes it to request less of the CPU's attention if several applications are open at the same time. If the priority is set to high, the application automatically gets more processor attention.

A Tornado Hit My Desktop

"Whenever I change the resolution of my monitor, all the icons for the files on my desktop get moved to new locations. My desktop now looks like an experiment in chaos theory. Even worse, when I return to my default resolution, the icon locations stay messed up."

Use Desktop Resetter. Changing a monitor's resolution isn't the only way to mess up your desktop icons. Another way is to use the Finder's Clean Up command. After you're done shouting obscenities (which the icons routinely ignore), you still have to put all the icons back in place.

You can avoid this aggravation with Desktop Resetter (Nick D'Amato; $10). Click just one Desktop Resetter button, and the program memorizes where your icons sit. When icons get out of order,

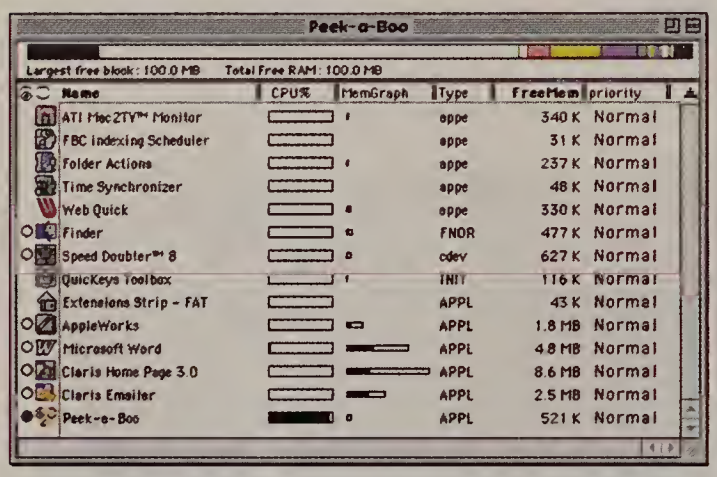
continues

just click another button to put them back where they belong.

It's a Hassle to Print from the Web

"Often I just want to print a couple of paragraphs from a Web page. Can I avoid having to copy the text to my word processor?"

Use Net-Print or WebPrint Plus. Install either Net-Print (John More; $15) or WebPrint Plus (Steve Becker; $15), and you can print any selection right from your browser. Even better, you can append separate selections to one file. Neither utility can print graphics, and you'll lose HTML-based text layouts. But for simply printing text, there are no easier solutions.

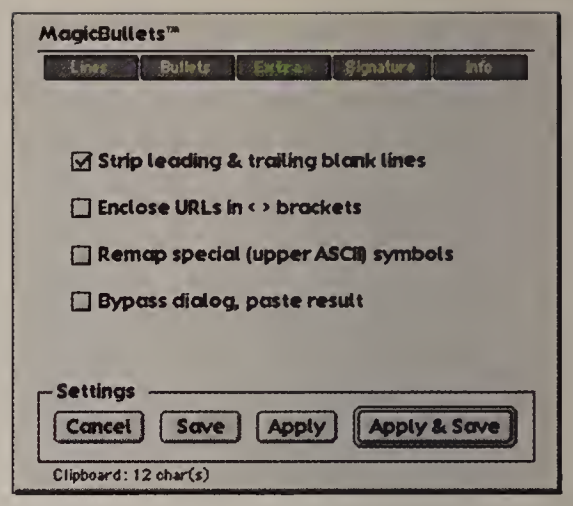


Reveal All Peek-a-Boo lets you see applications running on your Mac that you might not otherwise know were there. Only the items preceded by a circle appear in the Applications menu.

My E-mail Has More Odd Characters Than an Ally McBeal Episode

"When I copy an e-mail message to my word processor, hard returns appear at the end of each line—preventing the soft wrap that usually occurs. Plus I'm stuck with those angle brackets (>) that appear at the start of each line of quoted text. Isn't there some fast way to clean all this up?"

Use MagicBullets. This utility makes cleaning up your text as easy as copying it to the Clipboard. Just use **1**-shift-C, instead of the usual **1**-C, to have MagicBullets (Bill Karsh; $5) clean up unwanted characters in your text. Then you can paste it back over your original selection (see "Cleanup Time"). Other text-cleaning utilities may do a bit more, but none are quite as seamless to use.



Cleanup Time MagicBullets helps you clean up text, such as text you get via e-mail. It can, for instance, get rid of extra spaces and blank lines and enclose all URLs in brackets.

I've Lost the Contents of My Hard Drive

"My hard disk just crashed and burned. No utility could repair the drive or recover files from it—not Disk First Aid, not Norton Utilities, not anything. Short of spending the big bucks to get help from a disk-recovery company, is there any hope of getting back my files?"

Use Data Rescue. Data Rescue (The Wild Bits; $39) has become the court of last resort for data recovery. Although every recovery utility claims to recover certain files the others can't, no utility is successful as often as Data Rescue. The only downside is that it won't fix your drive; you'll still have to reformat that when you're done. **m**

TED LANDAU's MacFixIt Web site (www.macfixit.com) contains a library of the latest and greatest in troubleshooting utilities.

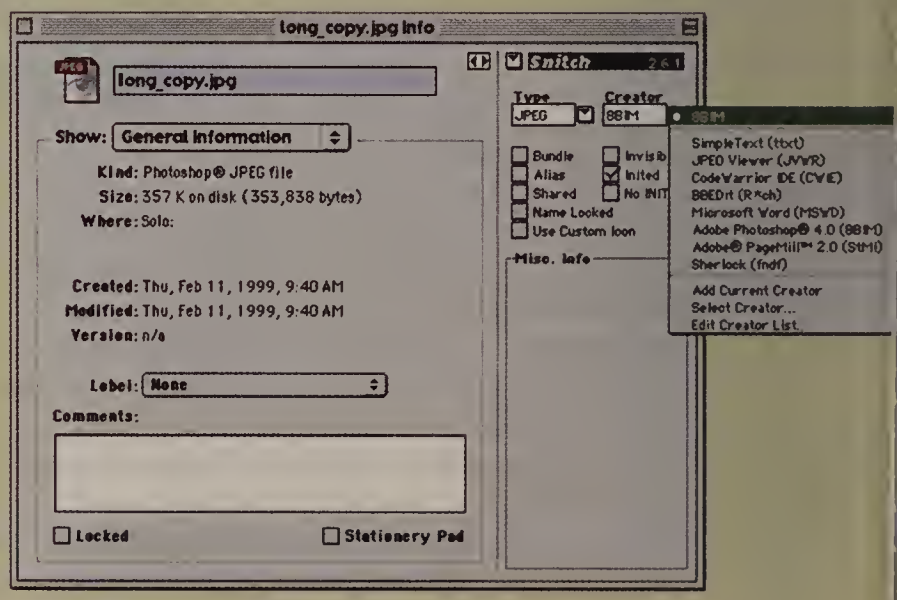
New Faces for Old Favorites

SOMETIMES ALL IT TAKES TO FIX A PROBLEM ON YOUR MAC IS updating software. Here are three scenarios in which shareware you already have installed may be showing signs of age.

Misbehaving StuffIt Expander Does Aladdin Systems' freeware StuffIt Expander refuse to decompress certain files? Your copy may be too old—StuffIt Expander 4.5 can't decompress StuffIt Deluxe 5.X or DropStuff 5.X files. Upgrade to version 5.1 or later.

Misguided TechTool Does TechTool report that your System file is damaged, even though you just installed a clean new copy of your system software? MicroMat's freeware utility is great for rebuilding the desktop, zapping your PRAM, and checking your System file for damage. However, every time Apple comes out with a new version of the Mac OS, you have to update TechTool as well—otherwise it erroneously reports that the System file is damaged. If you're using Mac OS 8.5.1, you need TechTool 1.1.8.

Snitty Snitch Do you get a system crash or other error when opening a file's Get Info window? If you use Snitch (Nifty Neato Software; $20) with Mac OS 8.5.X to add options to Get Info windows, make sure you have Snitch 2.6. Earlier versions simply won't work. If you've upgraded to Mac OS 8.5.1, you'll need an additional Snitch patch to get to version 2.6.1.



Get the Right Info Snitch puts handy options in the Get Info windows of your files. If you need help making changes, you can refer to Snitch's pop-up menus of common choices.

Tips, Tricks, and Shortcuts

by Lon Poole

Extensions are notoriously difficult to get properly housebroken. After painstakingly creating several custom start-up sets in Apple's Extensions Manager, David Battino of Cupertino, California, was dismayed to find that every time he installed new software, it would spray its extensions and control panels into all of his custom start-up sets.

He tried locking his start-up–set files (which reside in the Extensions Manager Preferences folder, inside the System Folder's Preferences folder) via the check box in their respective Get Info windows. This worked, but then the Extensions Manager insisted on making copies of the files whenever he tried to select them. The solution was to change each start-up set's file type from ESET to tamper-protected RSET with ResEdit or any other utility that lets you change a file's type. A start-up set whose file type is RSET appears with a padlock icon at the top of the Extensions Manager's Selected Set menu, just like the Mac OS Base set.

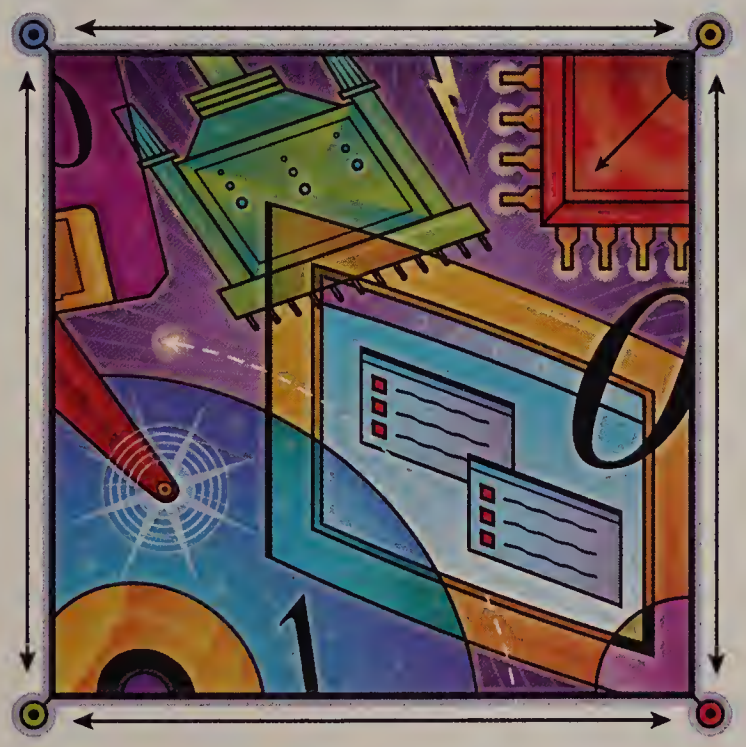
Access Your Whole Drive over the Web

Q. I use Mac OS 8.5's Web Sharing feature to access my office computer's hard drive via the Internet. But when I connect as the owner, I can see all the files on the hard disk but I can't download some types of files from nonshared folders. For instance, SimpleText and Deneba Canvas documents download fine, but I'm denied access to Microsoft Word documents unless they're in a shared folder. The Web Sharing control panel is set to use file sharing, for controlling user access (for obvious reasons); the Web Sharing preferences are set to allow aliases to open items outside the Web folder, and that folder contains an alias of my hard drive. So what am I missing here? I can't for the life of me figure this one out.

ROBERT BENEZRA
New York, New York

A. Unlike File Sharing, Web Sharing doesn't allow someone connecting as the owner to access all files on the hard drive unless the drive has been explicitly set for sharing.

Use the Finder's Sharing command



to turn off the option Share This Item And Its Contents for each folder you currently share. Then turn *on* this option for the hard drive, and set the owner privileges for the drive to Read & Write.

If necessary, you can also grant access privileges for the drive to a user or a group, and you can set access privileges differently for individual folders inside the drive. To prevent guest access, open the Users & Groups control panel, double-click the Guest icon, and make sure the option Allow Guests To Connect To This Computer is turned off.

Instead of using Web Sharing to access your files over the Internet, you might want to try OpenDoor Networks' ShareWay IP Personal (www.opendoor.com). This $79 utility magically makes the Mac OS's built-in personal file sharing available over the Internet or a TCP/IP intranet.

To access your office machine's hard drive through the Chooser on another Mac connected to the Internet or intranet, click the Chooser's Server IP Address button and type in the IP address of your office Mac. Then follow the usual procedure for connecting to a shared drive or folder; for example, enter the owner name and password in one dialog box and select your office Mac's hard drive in another dialog box. In a few moments, your office Mac's hard-drive icon will appear on the desktop of the remote Mac you're using, and you're in business.

You can also try Stairways' $10 shareware FTP server NetPresenz. It has more complex configuration options than Web Sharing, but it's faster and handles owner access like File Sharing does. Plus, you can use a Web browser instead of an FTP client to access the FTP server.

If you've blocked guest access to your FTP site, put your user name into the URL for your FTP site; for example, ftp://yourname@ftp.yourdomain.com. The browser will then ask for your password, unless you're using Microsoft Internet Explorer for Windows. In that case, you must include the password in the URL; for example. ftp://yourname:password@ftp.yourdomain.com. For security, quit the browser when finished.

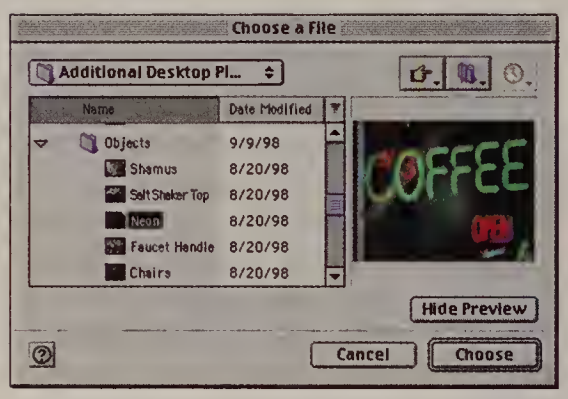
continues

Enjoy Enhanced Open and Save

Q. The March 1999 issue of *Macworld* refers at least twice to the ability to resize Mac OS 8.5's Open and Save dialog boxes. I have 8.5.1 and cannot resize unless I have Power On Software's Action Files utility installed. What am I doing wrong?

BILL BUNN
Brentwood, Missouri

A. The new dialog boxes appear only in programs whose developers have revised them to use the Navigation Services of Mac OS 8.5 and later, so it's going to be a while before they're available in every program. Meanwhile, if you want to experiment, try saving and opening in Sherlock or setting a desktop picture with the Appearance control panel (see "A Better Dialog Box").



A Better Dialog Box Open, Save, and other disk-related dialog boxes get a new look and many new features in Mac OS 8.5 and later—but only in applications that have been specifically revised to use 8.5's Navigation Services.

No-Hassle Sherlock Indexing

TIP If you want Mac OS 8.5's Sherlock program to index your hard drive after-hours but don't want to leave your computer on all night, use the Energy Saver control panel. Set it to start up your Mac several hours before you need it in the morning, and schedule Sherlock to begin indexing five or ten minutes after start-up. If you set these automated events to happen daily, your Sherlock index will be current every morning.

MATT SHUCKER
Phoenix, Arizona

If you prefer, you can have Sherlock index your hard drive just before your computer shuts down. At the end of the day, begin the indexing process in Sherlock. Once the Indexing Progress dialog box appears, switch to the Finder and shut down the computer. During the shutdown process, an alert appears asking whether you want to finish indexing before shutting down. Click this alert's Continue button and the computer will shut down after indexing is complete.

Or you can simplify the whole procedure by using the $10 shareware Index & Shutdown from Carnation Software. And if your Mac model can't be completely shut down under software control, you can add this capability for $70 or less with a Sophisticated Circuits PowerKey device (www.sophisticated.com/products/powerkey.html).—L.P.

Speed Up Slow Floppies

TIP Although the iMac's popularity may make 3.5-inch floppy disks less ubiquitous, many Mac users still depend on them. But a floppy that you've used over and over again can bring your system to a grinding halt when you wait for its icon to appear or window to open. The solution can be as simple as rebuilding the floppy's desktop file: hold down the ⌘ and option keys while you insert the disk. The increase in performance can be staggering.

TIMOTHY T. LUNDIN
Omaha, Nebraska

Make All the Moves

TIP If you enjoy playing Eric's Solitaire Sample (by Eric Snider and included on the Mac OS CD) and want to increase your chances of winning by not missing any moves, simply press the caps lock key and all playable cards will be highlighted.

MICHAEL NARDUCCI
Miami, Florida

Mount Faster over Networks

TIP You may know that you can quickly mount a file server or someone's shared folder from your network by opening an alias of the file server or shared folder on your Mac. This technique avoids the Chooser and Mac OS 8.5's Network Browser, but it always opens the alias's original item in addition to mounting it. Depending on network traffic and the amount of stuff in the file server or shared folder, you may need a haircut before it finishes opening. To mount the file server or shared disk without opening it, select the alias of it on your Mac and choose Show Original from the File menu (⌘-R) or the alias's contextual menu.

LAURIE SPIEGEL
New York, New York

Alternate QuarkXPress Shortcuts

TIP The shortcuts for switching tools in QuarkXPress—⌘-tab and ⌘-shift-tab—are also used for switching applications in Mac OS 8.5 and later. Despite the conflict, you don't have to change the shortcuts for Mac OS's Application Switcher using Mac OS Help, as described in February 1999's *Quick Tips*. Instead, simply press ⌘-option-tab and ⌘-option-shift-tab in QuarkXPress 3.32 and later to switch tools like normal.

MARTIN WINTER
Acworth, Georgia

Free .exe File Expansion

The latest version of Aladdin Systems' free StuffIt Expander (www.aladdinsys.com) decompresses the most common PC compression formats all on its own. With StuffIt Expander 5.1, you no longer need Aladdin's shareware Expander Enhancer (mentioned in April 1999's *Quick Tips*) to expand files whose names end with .exe, .zip, or .gz. **m**

LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld Mac OS 8.5 Bible* (IDG Books Worldwide, 1999).

All shareware and freeware mentioned in *Quick Tips* is available from the Macworld Online software library (www.macdownload.com).

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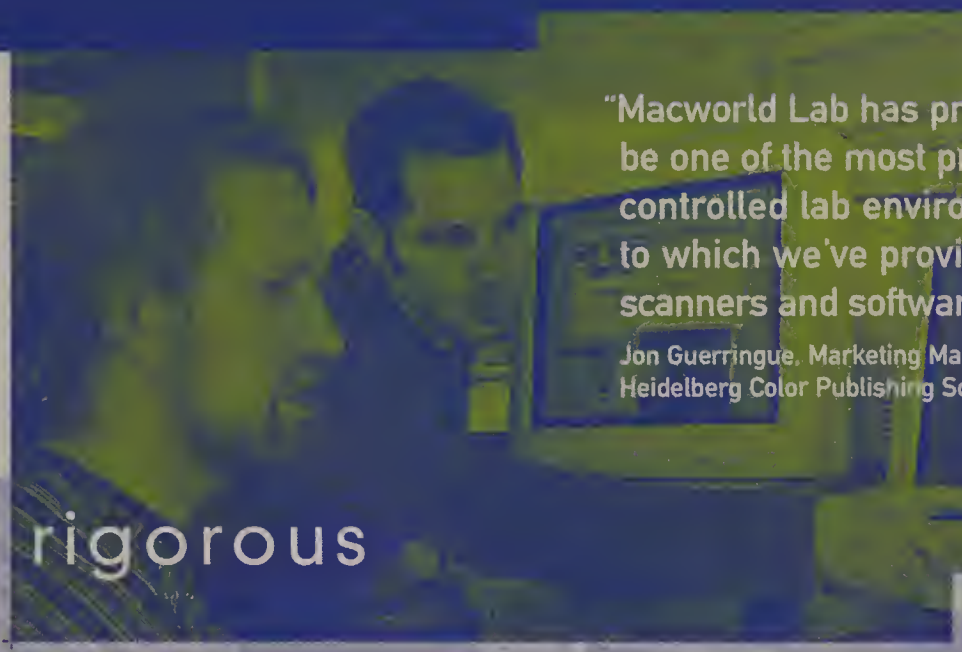

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Don't Sabotage Your Professional Print Job

TEN CLASSIC MISTAKES THAT MAKE A GOOD SERVICE-BUREAU JOB GO BAD

by Stephen Beale

You've been working for weeks on that eye-popping logo your client needed yesterday. Now you amble up to the counter with your Zip disk, ready to place your livelihood in the hands of a service-bureau technician. How can you be sure the graphic that sizzles on screen will look just as good in print? It all depends on what you do before you hand over the disk.

As a service-bureau customer, you have the right to see that the job is done well, on time, and at a reasonable price. But you also have a responsibility to learn what it takes to submit trouble-free files. *Macworld* surveyed a handful of service bureaus across North America to identify the primary causes—and solutions—for common imaging problems. Avoid these mistakes, and you'll reduce the odds of getting an unpleasant surprise when your packet comes back. Our thanks to SpectraComp (Mechanicsburg, Pennsylvania), the Printing House (Toronto, Ontario, Canada), Indian Rock Imagesetting (Berkeley, California), and Canterbury Press (Berkeley) for their assistance.

1. Be Slipshod with Your Prep Work

Most imaging services cite poor file preparation as the number one output problem they encounter. Common gaffes include submitting jobs with bad or missing screen or printer fonts, missing linked graphics, and incomplete or illegible job tickets—your instructions for handling the job. Before you submit your project, take some time to ensure that all the pieces are in place. Be especially careful with jobs that include embedded EPS files; any fonts those files include must be present for the job to print.

Adobe PageMaker and QuarkXPress both include features that gather the files associated with your job and store them in a folder you specify. PageMaker collects fonts and graphics, while QuarkXPress collects only graphics.

2. Throw Preflights to the Wind

It's all too easy to make a mistake that messes up a print job. Such errors as forgetting to include a font or submitting an image in the wrong format could cost you hundreds of dollars in wasted film or paper. The best defense is to

continues

use a preflight program—such as Preflight Pro, from Extensis (800/796-9798, www.extensis.com), or FlightCheck, from Markzware (800/300-3532, www.markzware.com)—to inspect your files for conditions likely to cause output errors. A successful preflight is no guarantee that your file will print correctly, but it certainly improves the odds.

3. Prance In without a Proof

If you're in a hurry, it's tempting to skip steps. One you should never skip, though, is generating a proof of each color separation on a PostScript laser printer before submitting your job to the imaging service. Proofing not only lets you check for mistakes but also helps ensure that the file is free of conditions likely to cause PostScript errors. Also, send a copy of the proofs along with the job to provide a guide for the service bureau's production staff. To avoid confusion, be sure the proofs reflect *all* last-minute changes to the file; if technicians see a discrepancy, they'll have to delay the job—perhaps adding to the output charges—to check with you.

4. Send Freaky Fonts

Here's another one that will make them squirm: submit only TrueType fonts. Font problems have long been the bane of imaging services, and they remain a common cause of output errors. To play it safe, stick with Type 1 fonts from recognized type foundries, and be sure to send copies of the screen and printer fonts along with the job to avoid font-substitution errors.

Some imaging services accept jobs with TrueType fonts, but most discourage it because PostScript output devices handle Type 1 better than they handle TrueType. You can tell the difference by looking at the font file's icon: Type 1 fonts have a single character in the icon, while TrueType fonts have three. Most preflight programs can help by quickly spotting those pesky TrueType fonts in your files.

Even more important than submitting the right type of font with your print job is using just one type. A print package that includes both TrueType and Type 1 fonts will put a few gray hairs on the head of any service-bureau worker. The service-bureau folks will also age prematurely if you throw in a cheap font or two from an unknown vendor—you know, those fonts from "Fonts Are Us" that cost $29.95 for 100. Such fonts tend to cause output problems.

5. Rebel against the Standards

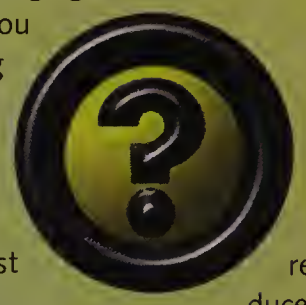
Using offbeat graphics and obscure publishing applications gets your service bureau in a snit and gives you unpredictable results. It's usually best to submit files from standard applications. You can count on your service bureau's having current releases of QuarkXPress, Macromedia FreeHand, Adobe Illustrator, Adobe PageMaker, and Adobe Photoshop (you can be sure Adobe's new InDesign will join the list soon). Its production staff should be experienced in dealing with output problems specific to these packages. If you're using a program that's not among the supported applications, you'll have to submit a PostScript print file, because the service bureau won't be able to open the native format.

In general, you should stick with recent software releases—including any updates that fix output-related bugs. However, there are exceptions: some ser-

Scan In or Take Out?

SHOULD YOU DO YOUR OWN image scanning or leave it to the service bureau? The answer depends on your budget, the volume of images you scan, and—perhaps most important—your quality standards.

Not surprisingly, most imaging services would prefer that you pay them to do the scanning for you, and they make a good point: they use costly drum or flatbed scanners and have staffers who are expert at getting the best quality from each scan.



On the other hand, high-resolution scans are expensive, even with volume discounts, and the current generation of midrange flatbed and slide scanners—which sell for $3,000 to $10,000—do an admirable job of capturing images for many kinds of publishing applications. If the image quality from these scanners is sufficient for your needs, you can save money and get an extra degree of control by purchasing one and doing your own scanning. You can also try a combination approach, turning to your service bureau for high-profile images or those you plan to enlarge, and using your in-house scanner for everything else.

If you plan to do your own scanning, you'll get the best results by scanning slides or transparencies instead of reflective copy. You'll also need to scan at a resolution sufficient to reproduce the image in print. As a rule of thumb, scan the image at about 1.5 times the resolution of the halftone you plan to produce. For example, if you plan to print the image with a 100-line screen, scan it at 150 dots per inch. This assumes that you'll reproduce the image at the same size as the original. If you plan to enlarge the image, you should boost the scan resolution by the same percentage.

vice bureaus prefer receiving jobs in QuarkXPress 3.X format due to output troubles in QuarkXPress 4.0, although subsequent updates have fixed many of these problems. Always check with the imaging service to see which programs and versions it supports.

It's also best to stick with standard formats when placing files in your page layout—typically EPS for vector graphics, and EPS or TIFF for bitmapped images. In most cases, avoid JPEG compression, which sometimes adds image artifacts. Many service bureaus also prefer that you avoid PICT files.

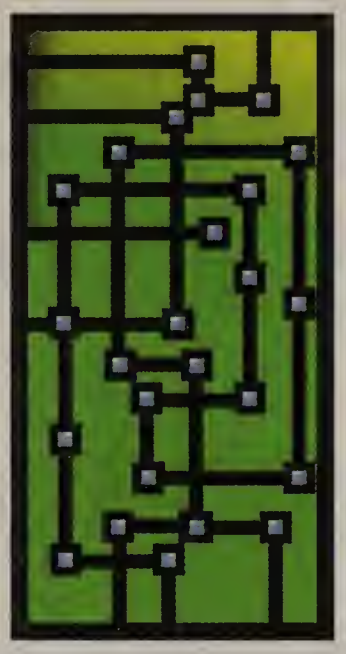
Some imaging services on the so-called bleeding edge accept files in the Adobe Acrobat PDF format, anointed as the prepress format of choice for the future. However, the future is not here yet, and while many imaging services are adopting PDF in their internal workflows, few are comfortable *receiving* PDF files—for now.

6. Exude Software Ignorance

Each major graphics and publishing program has certain idiosyncrasies that come into play when the application is producing high-resolution output at an imaging service. Learning these peculiarities and designing your print package to work around them makes printing go more smoothly. The program documentation should cover most of them; some software publishers even include commercial-printing guides for their packages. Your imaging service can also be a good source of information about application-specific issues, especially those related to particular output devices. However, avoid the temptation to use your imaging service as an unlimited source of free software training; that's another great way to sour a good working relationship.

7. RGB Them to Tears

Those RGB images that look so great on your computer screen won't print properly on most PostScript output devices. To make the images print, you must convert them to CMYK. If you're preparing images in Photoshop or another image-editing application, it's best to do the conversion after you've made all modifications to the images but before you import them into your page-layout software.



Be sure to keep a copy of the RGB version in case you want to use it later, since RGB offers a wider color gamut and is typically more amenable than CMYK to image modifications. You'll also need RGB if you want to produce slides or transparencies on a film recorder and, of course, if you want to post images on your Web site.

8. Vex Them with Vectors

Overcomplex vector illustrations can quickly bring a PostScript device—particularly one with an older raster image processor—to its knees. Especially treacherous are gradient fills and nested graphics (one EPS file inside another).

If you're having trouble printing a vector drawing, simplify it by deleting redundant points or hidden objects. You can also try converting it into a high-resolution bitmap.

If your EPS includes text, you may run into a different printing problem if the service bureau doesn't have the font you used. To avoid encountering such a problem, convert text to curves before you send the job off.

9. Mix Up Spot Colors

Some imaging services cite spot colors as a frequent source of output difficulties. One problem is that different applications may identify the same Pantone color with different labels. If you import a file into a page layout that includes the same spot color with a different label, the software thinks it's dealing with two distinct colors and prints an extra separation.

Make sure you're consistent when specifying whether you want to print the spot color as an extra ink or as a CMYK composite, or—again—you'll end up printing an extra separation. This is another instance in which printing a set of laser proofs can help you ward off printing problems.

Another common problem relates to *trapping*, a technique for avoiding misregistration between adjoining colors. Many imaging-service customers try to save money by performing their own trapping, only to pay more in the end because the service bureau has to remove what turn out to be bad traps. Most imaging services have automated trapping software and personnel experienced in using it.

10. Strive for Estrangement

People who are service-bureau "hoppers" don't get all the benefits a regular customer does. If you're a regular, the service bureau comes to know the ins and outs of your jobs, and you get to know the quirks of its equipment. During crunch times, you're likely to get better treatment than someone who walks in the door for the first time. You may also be eligible for volume discounts. However, it's also a good idea to identify a backup facility you can use if your primary service bureau's equipment goes down.

As in any relationship, effective communication is paramount. Always consult with your service bureau's rep before embarking on a complex project that will require its assistance. **m**

Senior Editor STEPHEN BEALE covers imaging products and technology for *Macworld*.

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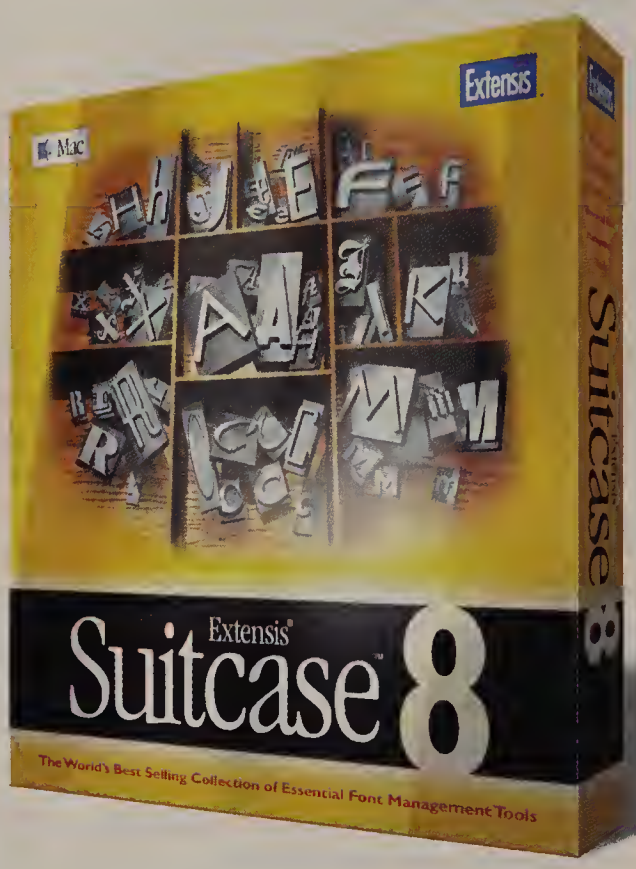

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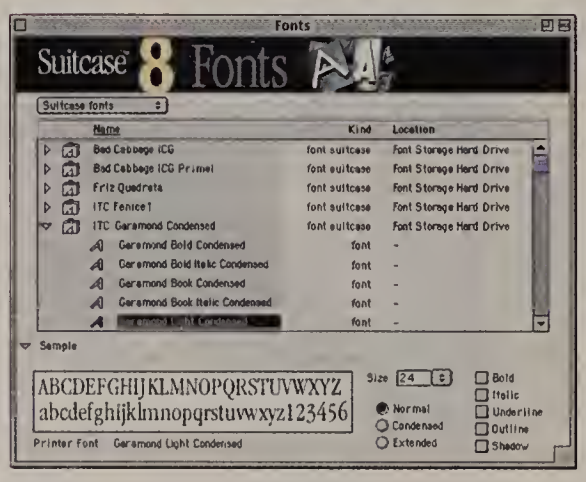

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Master Photoshop's Masking Tools

EXPERT TECHNIQUES TO SIMPLIFY MAKING SELECTIONS

by David Blatner

Anyone who's ever painted a room or a house knows that masking tape is an essential tool for determining what gets paint on it and what doesn't: put tape on a windowpane and paint the frame, pull the tape off and the glass is paint free. Adobe Photoshop also comes bundled with a roll of masking tape—digital masking tape, of course—hidden in three different features: selections, alpha channels, and masks.

Digital masking tape is better than real masking tape—you just need to learn how to manage and manipulate it efficiently. Someone could write an entire book about the hundreds of tips and techniques for making *selections* (which determine where the masking tape is placed), but it all really comes down to one thing: getting a good *transition* between what's selected and what isn't.

To borrow a phrase from the folks at Ultimatte: "There are no edges . . . only transitions." A clumsy transition results in edge spill: colors from the background spill over into the masked part of the image, making the image look artificial and out of place when it's dropped onto a different background (see "Choke and Spread Edges").

In this article I discuss techniques that help you get good selections quickly and then build selections to composite images together. The techniques are also appropriate for other uses, such as making a selection before applying a filter or using painting tools. In some cases, commercial plug-ins (mentioned below) may do the job better and faster, but with a little practice you should be able to make expert selections with relative ease.

See www.macworld.com/more/ to learn how to transform selections made with the standard marquee tool.

Principles of Masking

If you remember only one thing from this article, it should be this: selections, alpha channels, and masks are all exactly the same thing in Photoshop's eyes. Whenever you make a selection in Photoshop, the program "sees" that selection as a gray-scale image in which the selected parts are white and the nonselected parts are black. The black part is the digital masking tape, covering the parts of the image that aren't selected; the white part is "uncovered" and ready for painting.

The powerful thing about digital masking tape is its relationship with the color gray: you can also partially select pixels in your image, and these areas are represented by shades of gray. The paler the gray (that is, the closer to white) an area is, the more pixels are selected. Generally, the edges of a selection's mask are slightly gray (or *antialiased*) to create a gentler transition between white and black areas.

Quick Mask There are several ways to see a visual representation of your selection. One is Quick Mask mode, which you can switch to by clicking on the Quick Mask button at the bottom of the Tool palette or by pressing the Q key. In Quick Mask mode, the masking tape is colored (usually red, to remind us old-timers of rubylith), and the selected parts

continues

Select and Compose This composite image was formed by conquering several selection challenges, as described in "Choke and Spread Edges," "Extract from a Channel," and "Make Layer Masks." (See www.macworld.com/more/ for "Transform Selections.")

are transparent instead of white. Because Photoshop's regular "marching ants" selection marquee isn't very precise, I tend to use Quick Mask mode for everything but the most basic rectangular selections.

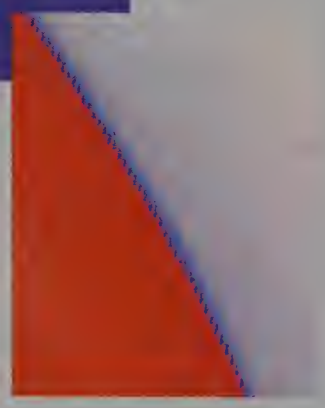
You can edit your selection by editing the Quick Mask—paint in it, use filters, and so forth. Don't be afraid to custom-paint your selections instead of using the standard selection tools. Just switch to Quick Mask mode, paint in areas with the various brush tools, and press Q again to leave Quick Mask mode and see the marching ants around the area you painted.

Channels and Layer Masks Another way to get a visual representation of your selection is to save it as an alpha channel. Don't be scared by the term *alpha;* it just refers to a gray-scale channel—in addition to the regular CMYK or RGB channels (see "Extract from a Channel")—that stores the mask information. You can save a selection as an alpha channel by choosing Save Selection from the Select menu or by clicking on the Save Selection As Channel button at the bottom of the Channels palette. Whereas Quick Masks disappear when you deselect your selection, you can save alpha channels with your document and

Choke and Spread Edges

NEVER EXPECT A TOOL TO MAKE A GOOD SELECTION BY itself. The magic wand and Photoshop 5's magnetic-lasso tools are good cases in point: both make a perfectly adequate first pass at creating a selection, but then it's your turn to fine-tune it. Because the biggest problem with selections is usually edge spill, you need a good technique to *choke* or *spread* the selection—make it uniformly smaller or larger. While the Contract and Expand options in the Select menu's Modify submenu work fairly well, I find they're usually too blunt an instrument. Here's another option you can use instead.

A

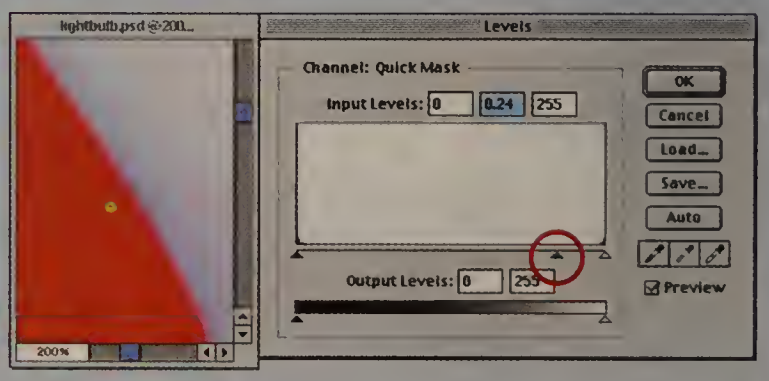


B

1 At first glance, using the basic magic wand to draw around the lightbulb gives me a reasonable selection (A). But when I switch to Quick Mask mode and zoom in, I can see where edge spill will occur (B). (Quick Mask mode is one of the best ways to detect edge spill.)

2 While in Quick Mask mode, I run the Gaussian Blur filter with a radius of 1 or 2 pixels. The edge spill immediately worsens, but it's one step back in order to go forward.

3 Now I open the Levels dialog box (⌘-L) and drag the gray midpoint slider to the left and the right, making sure the Preview check box is turned on so I can see how the Quick Mask chokes or spreads as I adjust this slider. Dragging to the right chokes and dragging to the left spreads. I drag about three-quarters of the way across the slider, stopping when the edge spill is gone. Then I exit Quick Mask mode and the selection is complete, sans edge spill.



reload them later as selections.

You can also save a selection as a layer mask (see "Make Layer Masks"). When you choose Add Layer Mask from the Layer menu, you're telling Photoshop to add masking tape to that layer so that specified parts of it are obscured. The mask you create is then attached only to that layer. This way, you needn't delete parts of a layer—layer masks are nondestructive, so if you change your mind, the original layer is still intact.

Selection Tips and Tricks

Even if you know your way around Photoshop's selection tools, there are always new ways to use them more efficiently. Here are a few helpful hints.

Marquee Positioning If you're expanding a rectangular or oval selection marquee and you realize that you didn't position its origin in exactly the right place, don't fret: with the mouse button still held down, press the spacebar. Now you can move the entire selection and reposition its starting point. Release the spacebar and then continue expanding the selection as before.

Selecting Hidden Parts In Photoshop 5 you can select pieces of your image that lie outside the image boundary—hidden by the gray canvas that surrounds the document—by option-dragging with the lasso tool.

Lasso Toggling If you want to draw a straight line while using the lasso tool, hold down the option key, release the mouse button, and draw the line. To draw freely again, press the mouse button and release the option key.

Magic-Wand Trickery People typically use the magic-wand tool to select parts of an image, but sometimes it's easier to *deselect* using the magic wand. Drag a rectangular marquee over a big chunk of your image, hold down the option key, and click on the magic

continues

Extract from a Channel

ONE OF THE MOST POWERFUL BENEFITS OF SELECTIONS AND channels being equal in Photoshop is that you can use the information in a channel to make a superior selection. There are many variants of the following technique, including running a High Pass or Median filter on your alpha channel. Keep an open mind and experiment.

1 Trying to select the wires and steel structures in this complex image using only the standard selection tools would be a nightmare.

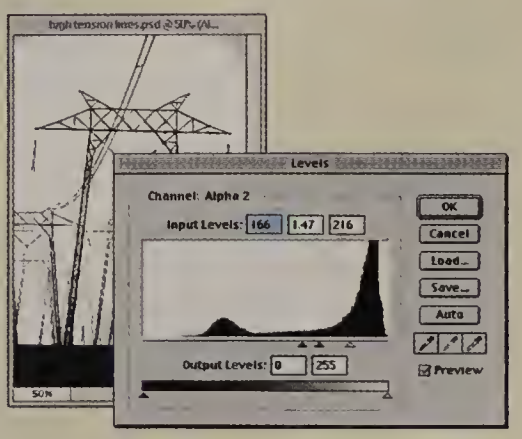
2 Instead, I look at each of the image's channels by pressing ⌘-1 for red (at left), ⌘-2 for blue (center), and ⌘-3 for green (right). I find the channel with the best contrast between the background and the objects I'm trying to select. Here, the red channel is the winner.

Red channel

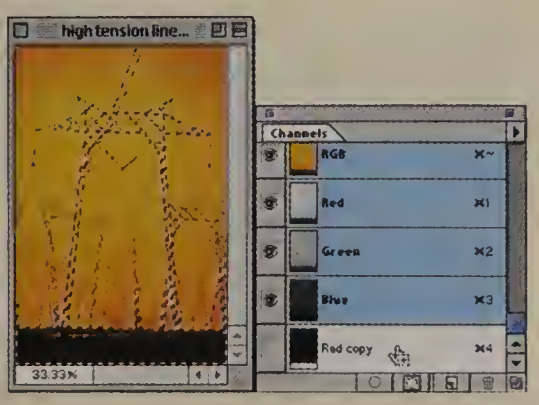
Blue channel

Green channel

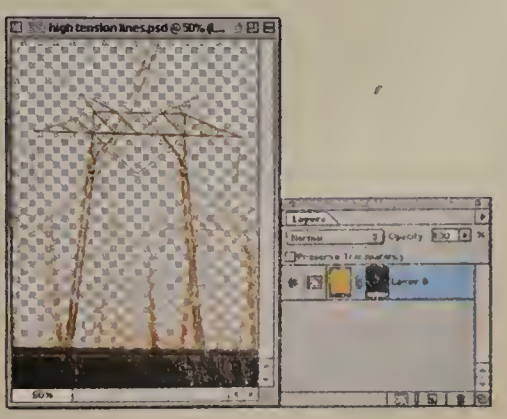
3 I duplicate the red channel by selecting Duplicate Channel from the Channels palette's pop-up menu. Then I manipulate the Levels on the duplicate until the parts I want masked are fully black and the parts I want selected are fully white; I make sure to have a soft gray transition between the two to prevent the result from appearing choppy. (Instead of using Levels, you can use painting tools, filters, Curves, or any other Photoshop feature to achieve the mask.) When finished, I invert the channel (⌘-I) to make the background black.



4 Finally, to load the selection I ⌘-click on this channel in the Channels palette (A). For greatest flexibility I convert the background layer to a regular layer by double-clicking on it, and then choose Add Layer Mask from the Layer menu. This way, the background becomes transparent (B). I can then drag the entire layer over to the composited file for final adjustments.



A



B

wand to deselect parts you don't want.

Color Quick Change It's often helpful to change the Quick Mask's red color to something that stands out better—especially if your image contains red. To do this, double-click on the Quick Mask icon at the bottom of the Tool palette, and alter its color and opacity in the Quick Mask Options dialog box. I generally set the opacity to 70 or 80 percent.

One-Step Loading Here's a shortcut to load a channel as a selection: ⌘-click on the channel in the Channels palette. You can also load a layer's transparency mask (the parts of the layer that are transparent) by ⌘-clicking on the layer in the Layers palette.

Should You Buy a Plug-In?

If after trying the selection tools and techniques described in this article you feel you're spending too much time making a good selection, you might want to consider buying a commercial plug-in that facilitates selections, such as the $300 Mask Pro from Extensis (800/796-9798, www.extensis.com), $100 MagicMask from Chroma Graphics (888/824-7662, www.chromagraphics.com), and $495 KnockOut from Ultimatte (818/993-8007, www.ultimatte.com). Each plug-in has its strengths and weaknesses, so make sure the one you pick will do the job for you. Time is valuable, so a plug-in may pay for itself quickly.

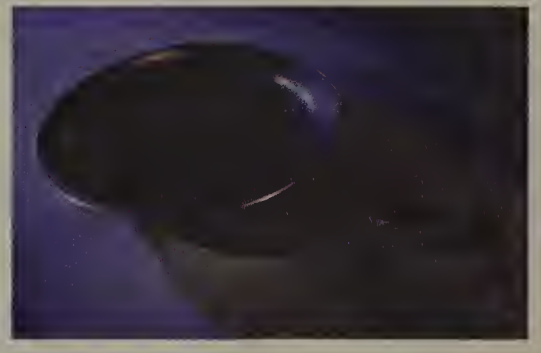
But try to be patient—making a good selection takes time, and the more detailed the area, the longer it'll take. With a little practice you should be able to make expert selections with relative ease, and put Photoshop's powerful digital masking tape to work for you. **m**

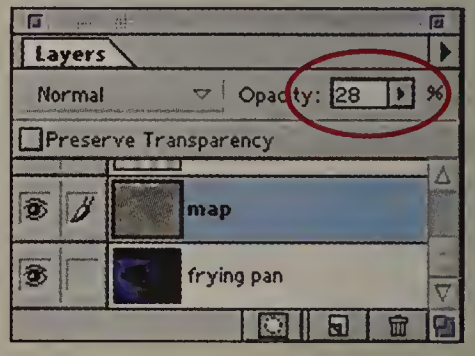
DAVID BLATNER (david@moo.com) is a coauthor of *Real World Photoshop 5* (Peachpit Press, 1998) and a frequent speaker at seminars and conferences.

Make Layer Masks

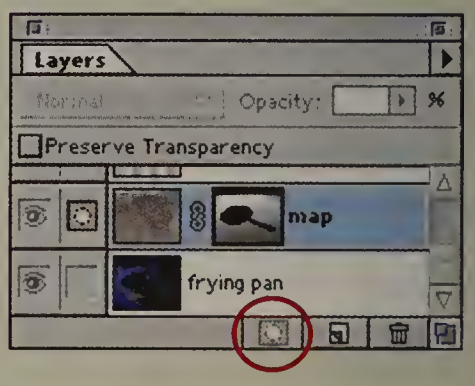
COMPOSITING IMAGES IS MORE ART THAN SCIENCE, AND IT involves many painstaking tweaks to get right. If you don't use layer masks when compositing, you're going to need aspirin by the end of the day, because each tweak destroys more and more of your image. Layer masks give you (and/or your art director) many opportunities to change your (or his or her) mind without degrading image quality.

1 Here I've dropped an image of a city map over the background picture and set the opacity to 28 percent. However, the map covers the frying pan. But instead of trying to cut out the frying pan and put it on a layer over the map, it's easier to use a layer mask in the map layer.

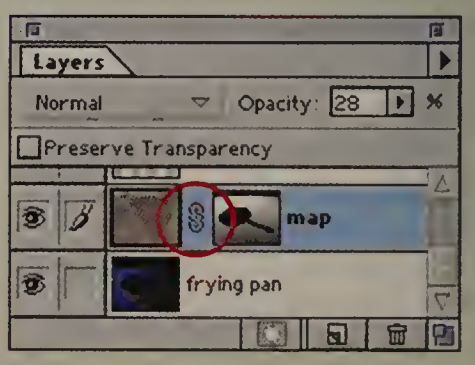




2 I select the frying pan and save it as a layer mask by clicking on the Layer Mask button at the bottom of the Layers palette. Then I add a gradient to the layer mask and use the Filter menu's Fade command *after* running the gradient to adjust the mode and opacity of the effect.



3 With the layer mask turned on, that portion of the map is invisible. To move the map image without moving the layer mask, I can click on the link icon between the two thumbnails in the Layers menu, which deactivates the link. To turn off the layer mask without deleting it, I can shift-click on the layer mask.



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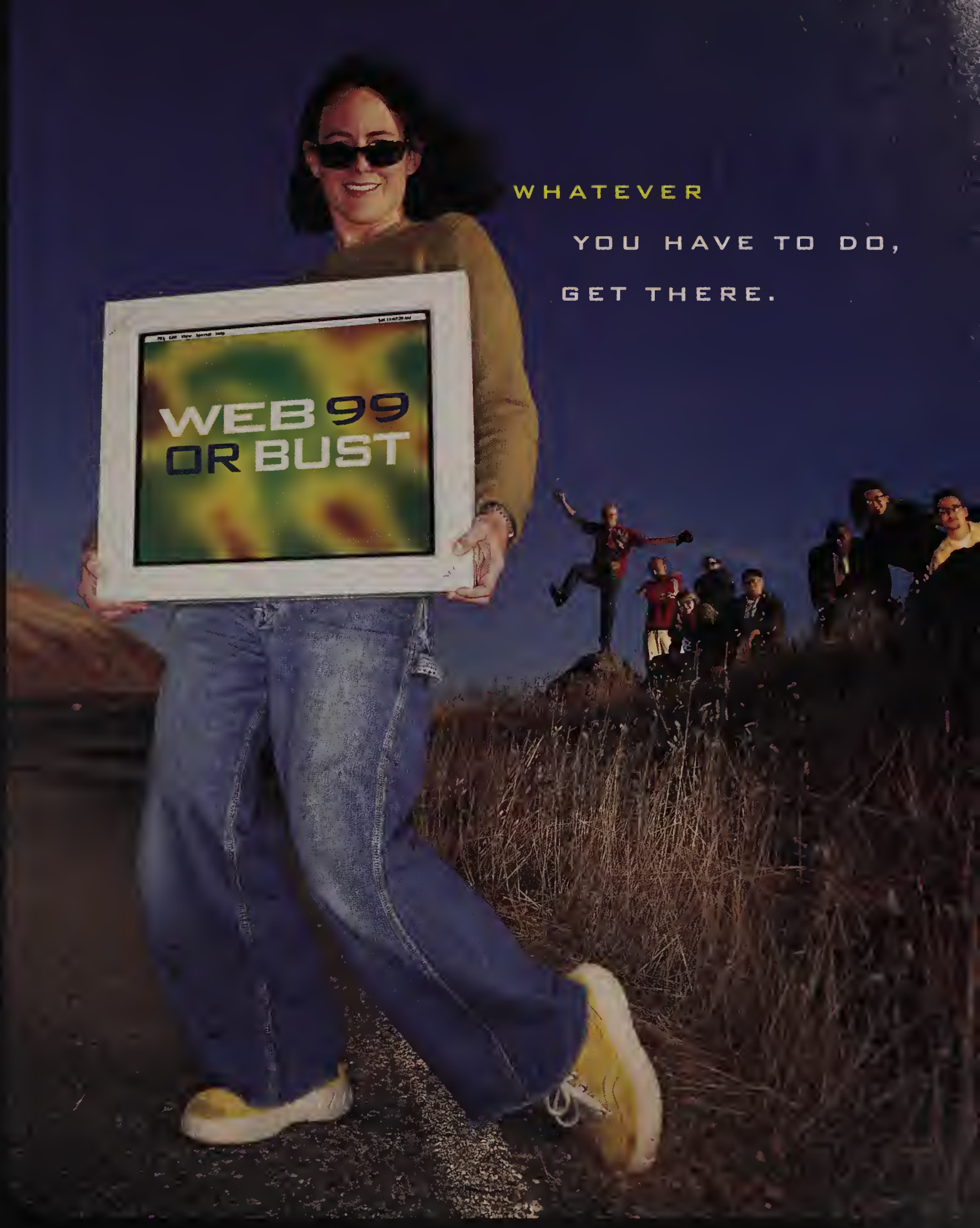

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Turn Snapshots into Art

MAKE INSTANT ILLUSTRATIONS WITH FOUND PHOTOS

by Janet Ashford

Ever watch a street-fair artist make a convincing sketch right on the spot? It's a great skill, but surprisingly not all artists have it. As cartoonist Robert Crumb said, "You say you can't draw a straight line? Don't let those artists fool you. They all use rulers." Not only do they use rulers—artists also use photo references to help them draw more accurately.

For computer-based illustrators, tracing over photos is a great way to create realistic drawings quickly. By combining parts of different photos, you can make custom illustrations that aren't limited to the imagery in a single photo. This is the technique I used to create the image of the coffeepot, cup and saucer, and teapot.

For this project I used three found photographs, a Microtek ScanMaker II HR scanner, Adobe Photoshop 5.0, an Apple LaserWriter II printer, a light table, Adobe Illustrator 8.0, Adobe Streamline 3.1, a number 2 pencil, and matte acetate.

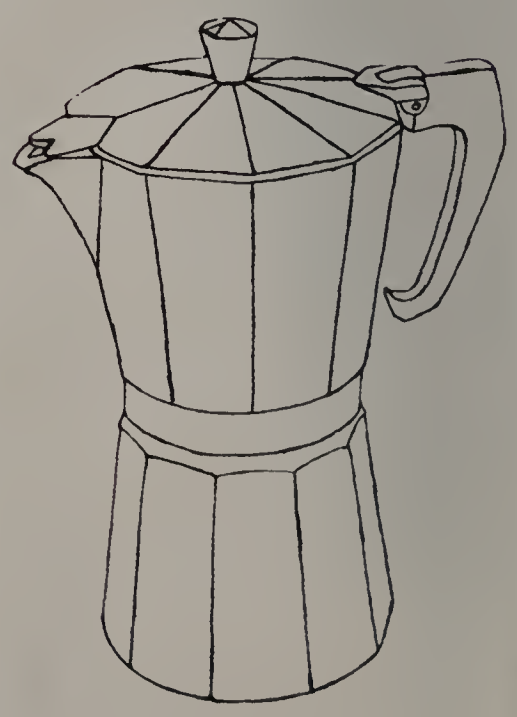
I scanned in the photos, increased the contrast, and used Photoshop's Unsharp Mask filter to emphasize the edges of the objects. Then I printed the images, traced them on my light table, and scanned the sketches back into Photoshop. I converted the images to PostScript paths in Adobe Streamline and then used Illustrator to create the composition and add color.

Next I brought the composed image into Photoshop and used filters and layers to add texture and depth to the final illustration. The whole process took little more than two hours, and the time I spent drawing by hand was a welcome break from my daily computer work. m

JANET ASHFORD (www.jashford.com) is a freelance designer and coauthor of *Start with a Scan* (Peachpit Press, 1996).

1 First I picked three photos from my collection of snapshots: one of an espresso pot, another of a cup and saucer, and a third of a teapot. I scanned in each photo at 300 percent, converted them to gray scale in Photoshop, increased the contrast, and applied the Unsharp Mask filter to accentuate the forms' edges.

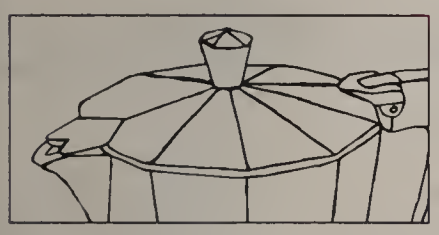
2 Next I printed out the black-and-white photos on my laser printer, slapped each one onto my light table, and covered them with matte-surfaced acetate. I traced over the prints with a number 2 pencil, following the edges of the objects and making sure my pencil marks were dark and solid. I used solid black lines to enclose all areas I planned to fill with color, leaving no line breaks to allow "bleeding." Then I scanned in the pencil drawings and opened them in Photoshop.

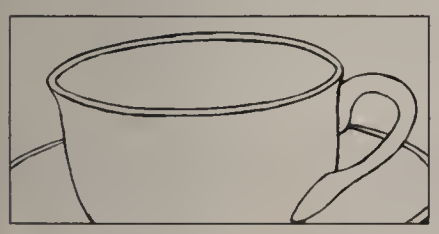


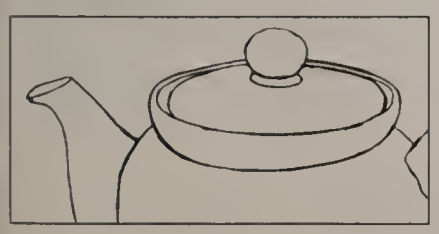
6 The final result is an image with pleasing shapes; a softened, textured effect; and interesting color artifacts.

5 To add texture, I opened the finished Illustrator EPS in Photoshop and experimented with various filters. I made a softly textured version by applying the Rough Pastel filter, and a black-and-white version by applying the Charcoal filter. Then I placed each of these versions in separate layers in a single Photoshop file. I put the black-and-white version in the top layer and set it to 50 percent opacity in Overlay mode.

3 At this point I could have combined the three sketches in Photoshop and added bitmapped color and texture. But I decided to develop the images further in Adobe Illustrator, so I used Adobe Streamline to autotrace each scanned drawing and convert it to PostScript paths. I used the Outline method, setting the Tolerance to Tight to pick up as much detail as possible.







4 I opened each PostScript drawing in Illustrator, and sized and positioned them in a single Illustrator file to create a pleasing composition. Next I filled the white shapes inside the black lines with solid colors. Then I imported the gray-scale TIFF version of each object to use as a reference for drawing the table edge and shadows, and filled the shadows with solid colors. This produced a flat, smooth-textured piece of art.

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SUMMARY NOTICE OF SETTLEMENT AND SCHEDULING OF HEARING ON FINAL APPROVAL OF CLASS SETTLEMENT

ATTENTION

TO: **ALL PERSONS OR ENTITIES WITHIN THE UNITED STATES WHO PURCHASED NEW, FOR THEIR OWN USE AND NOT FOR RESALE TO OTHERS, CERTAIN APPLE HARDWARE PRODUCT MODELS INTRODUCED IN THE MARKETPLACE BETWEEN APRIL 1, 1993, AND APRIL 1, 1996, AND APPLE PERFORMA PRODUCT MODELS INTRODUCED IN THE MARKETPLACE BETWEEN SEPTEMBER 1, 1992, AND APRIL 1, 1996, WHO WERE AFFECTED BY THE OCTOBER 13, 1997, CHANGE IN APPLE'S TECHNICAL SUPPORT POLICY:**

THIS SUMMARY NOTICE IS GIVEN TO INFORM ALL POTENTIAL CLASS MEMBERS OF A PROPOSED SETTLEMENT OF ACTIONS THAT MAY AFFECT THEIR RIGHTS. PLEASE READ THIS SUMMARY NOTICE CAREFULLY AND IN FULL.

IF YOU PURCHASED WITHIN THE UNITED STATES, FOR YOUR OWN USE AND NOT FOR RESALE, A NEW APPLE COMPUTER, INC. ("APPLE"), HARDWARE PRODUCT MODEL INTRODUCED IN THE MARKETPLACE BETWEEN APRIL 1, 1993, AND APRIL 1, 1996, OR A NEW APPLE PERFORMA PRODUCT MODEL INTRODUCED IN THE MARKETPLACE BETWEEN SEPTEMBER 1, 1992, AND APRIL 1, 1996 ("COVERED PRODUCTS"), AND YOU WERE AFFECTED BY THE OCTOBER 13, 1997, CHANGE IN APPLE'S TECHNICAL SUPPORT POLICY, YOU MAY BE A MEMBER OF THE CLASS AND YOUR RIGHTS WILL BE AFFECTED BY THE PROCEEDINGS IN THESE ACTIONS. IF YOU ARE A MEMBER OF THE CLASS DESCRIBED ABOVE AND YOU DO NOT REQUEST EXCLUSION FROM THE CLASS, YOU WILL BE A "SETTLEMENT CLASS MEMBER" IF CERTIFICATION OF THE CLASS IS FINALLY APPROVED.

NOTICE IS HEREBY GIVEN that a hearing will be held before the Honorable Robert Baines of the Superior Court of California for the County of Santa Clara, located at 191 North First Street, San Jose, California, on August 20, 1999, at 10 o'clock a.m. to determine: (1) whether the proposed settlement of Actions on terms set forth in a Settlement Agreement and Release dated March 25, 1999, is fair, reasonable and adequate; (2) whether a settlement class should be certified; (3) whether the Court should enter the proposed final judgement; and (4) whether the application of counsel for the class for an award of attorney's fees and expenses in an amount up to $875,000 should be granted.

DESCRIPTION OF THE ACTIONS: Class Representatives in the Actions allege that Apple wrongfully denied purchasers of the Covered Products live telephone technical support at no charge that it had previously promised them. Apple has denied these allegations and alleged numerous affirmative defenses.

DESCRIPTION OF THE SETTLEMENT: Under the terms of the proposed settlement, Apple will provide the following benefits to Settlement Class Members: (1) Effective March 1, 1999, Apple will resume providing live telephone technical support at no charge to all original purchasers of the Covered Products for the life of their Covered Products. (2) Apple will refund to Settlement Class Members any and all sums paid to Apple for diagnostic technical support for Covered Products (this refund will be automatic; Settlement Class Members do not need to take any action to receive the refund). (3) Apple will reimburse Settlement Class Members for payments made to a company other than Apple for diagnostic technical support for Covered Products during the time period October 13, 1997, to March 1, 1999 (requires submission of a Claim Form as explained below). (4) Apple will provide a maximum of 480,500 $50 coupons redeemable at The Apple Store On-Line for Apple-branded hardware and Apple-branded software products (excluding printer consumables) priced at $99 or more (pre-tax) to Settlement Class Members who were refused live technical support at no charge (requires submission of a Claim Form). (5) Apple also has agreed to pay all costs of mailed and published notice, as well as to pay an amount not to exceed $875,000 in full payment of the fees and expenses of Class Counsel.

HOW TO RECEIVE SETTLEMENT BENEFITS: If you are a Settlement Class Member, provision of live technical support at no charge and refund of payments to Apple for diagnostic technical support for Covered Products is automatic. You need not send in a Claim Form to receive these benefits. However, to receive reimbursement of payments you made to third parties for diagnostic technical support, or to receive a $50 coupon, **you must submit a Claim Form on or before September 8, 1999. To receive a Claim Form and copies of the detailed "Notice of Proposed Class Settlement," which lists the Covered Products and describes the Actions, the proposed settlement, and the rights and options available to Class Members, you may call 1-800-752-0946 or you may download it from the following web site: http://www.apple.com/legal/techsupportsettlement.html.**

REQUESTS FOR EXCLUSION AND OBJECTIONS: Any requests for exclusion from the proposed settlement must be sent by certified mail to Martin W. Anderson of Anderson & Anderson, 2070 North Tustin Avenue, Santa Ana, California 92705, postmarked on or before July 2, 1999. Rights regarding exclusion are fully explained in the "Notice of Proposed Class Settlement."

Any objections to the proposed settlement must be filed with the Court and copies sent by certified mail to Martin W. Anderson at the above address and to Penelope A. Preovolos, Morrison & Foerster, 425 Market Street, San Francisco, California 94104, postmarked on or before July 2, 1999. The procedure for making an objection is fully explained in the "Notice of Proposed Class Settlement."
DO NOT CONTACT THE COURT OR THE CLERK'S OFFICE FOR INFORMATION.

Dated: March 26, 1999

By: Order of the Santa Clara Superior Court
Robert A. Baines
JUDGE OF THE SUPERIOR COURT

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#44230
233MHz Apple Macintosh PowerBook G3
32MB RAM/2GB Hard Drive/20X CD-ROM
14.1" Active Matrix Display
56K Modem

Authorized Catalog Reseller

CALL FOR EVEN LOWER PRICES!

Power Book G3s!			
Order #	#44231	#44232	#44233
MHz	266	300 w/CD	300 w/DVD
RAM	64MB	64MB	64MB
WAS	~~$2,998~~	~~$3,998~~	~~$4,398~~
NOW	~~$2,618~~	~~$2,988~~	~~$3,438~~

LAST CHANCE!
Win a 1999 Porsche Boxster!
Register at www.macmall.com

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We'll Beat any Price!
On any Mac. See inside for details.

Colors, Colors, Now at 333MHz!

iMac™ Essentials!

iMac™ Starter Kit

Includes:

- iMac Blue 7-outlet surge protector
- iCatch ergonomic mouse adapter
- iMac Blue CD-rack
- Web Buddy 2.0 software

all for only

$29.99

Ask for #42105

MacMall Exclusive!

Shipped in promotional packaging.

Epson Stylus 740i Printer

New Blueberry Casing!

- 1440 x 720dpi
- 6ppm black
- 5ppm color

only **$249.99**

Ask for #45418

Price reflects $30 mail-in rebate. Call for details.

Customize to match your iMac!

USB UNIVERSAL SERIAL BUS

EPSON

Iomega® Zip® 100MB USB

- Enjoy unlimited storage capacity and easy USB connectivity!
- Easy to connect
- Hot swappable
- Translucent blue

Iomega® Zip® 100MB USB *was* ~~$149.99~~ **$129.99** #34314

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Apple Computer Loan Disclosure – Based on 67 monthly payment amounts of $24.75 per $1000 purchased. 14.89% Annual Percentage Rate Subject to increase or decrease. Introductory Rate of 5.9% for 90 days. Loan origination fee of 4% of the amount financed added to loan balance on day 91. Payments deferred for the first 120 days. No prepayment penalty. On approved credit. Tax and shipping not included. ©1998 Apple Computer, Inc. All rights reserved. The Apple logo is a registered trademark and iMac™ is a trademark of Apple Computer, Inc.

Authorized Catalog Reseller

iMac's starting

Lowest price anywhere—Guaranteed!

The translucent iMac combines all the possibilities of the Internet with the magic of the Macintosh. And now, you can own one for less than ever! This iMac offers the high speed, easy-to-use USB, a built-in modem, a Pentium-toasting 233MHz G3 processor, 32MB of fast SDRAM, and surround sound—plus Mac OS 8.5 and a ton of outstanding software!

A technological wonder. And it's all yours.

Processor and Memory

- 233MHz Power PC G3 Processor
- 512K backside level 2 cache on processor module
- 133MHz dedicated 64-bit backside bus
- 66MHz system bus
- Integrated floating-point unit and 64K on-chip level 1 cache (32K data and 32K instruction)
- 32MB of SDRAM; two SODIMM slots support up to 256MB
- 64-bit memory bus

Storage

- Internal 4GB IDE hard disk drive
- Internal 24X (maximum) CD-ROM drive

Connectivity

- Two high speed Universal Serial Bus (USB) ports (12 Mbps), which support USB devices such as keyboard, mouse, printer, storage devices, and USB hubs

Communications

- Built-in 10/100BASE-T Ethernet
- 56Kbps modem supports K56flex and V.90 standards

Multimedia capabilities

- Incredible, high resolution display... MultiScan, tiltable shadow mask color display; 15-inch (13.8-inch diagonal viewable image size); .28mm dot pitch

Last Chance!

Exclusive

Apple® iMac™

only **$898**

#44098

Call for even lower price! While supplies last.

Order Any Time. Open 24 Hours.

1-800-217-9492

Order Today by 10pm EST—Get it Tomorrow by 10:30am

PRICES SLASHED!

as low as $~~899~~!

What flavor is your new 333MHz iMac?

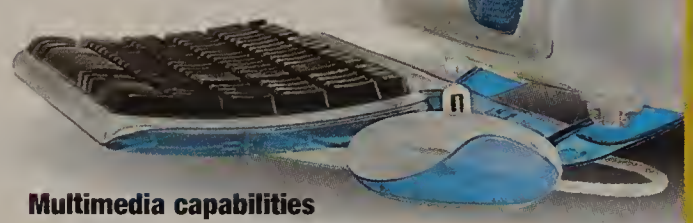
Now, the world's best selling personal computer comes in colors! Choose from blueberry, tangerine, grape, lime and strawberry translucent shades. Best of all, this iMac also offers you more power, including a massive, 6GB hard disk, a faster-than-ever, 333MHz Power PC G3 processor, 32MB SDRAM, 24x CD-ROM drive, 2 built-in USB ports and more!

It looks like the future. And it takes you there.

Not just a pretty face: this model has power!

- 333MHz Power PC G3 Processor
- Internal 6GB IDE hard disk drive for
- Internal 24X (maximum) CD-ROM drive
- Two high speed USB ports (12 Mbps), which support USB devices such as keyboard, mouse, printer, storage devices, and USB hubs
- 512K backside level 2 cache on processor module
- 133MHz dedicated 64-bit backside bus
- Mac OS 8.5 pre-installed
- AppleWorks, Adobe PageMill and more!

Technical Specifications may vary.
Actual Colors may differ slightly from printed catalogs.



Multimedia capabilities

- Incredible, high-resolution display... MultiScan, tiltable shadow mask color display: 15-inch (13.8-inch diagonal viewable image size), .28mm dot pitch
- Supports millions of colors at up to 1024 x 768 resolution (24-bit)
- ATI RAGE PRO TURBO accelerated 2D/3D graphics controller and 6MB video memory

New 333MHz!
Now In Your Favorite Colors

Colors!

only $1,198

or only $27.45 per month

● #44249 Blueberry ● #44243 Grape ● #44247 Lime ● #44245 Strawberry ● #44244 Tangerine

MICRO CONNECTORS, INC.

#43777	USB Upgrade Kit-Blueberry Hub/6' Cable Mouse/Mousepad	$59.99*
#43774	USB Upgrade Kit-Grape Hub/6' Cable Mouse/Mousepad	$59.99*
#43776	USB Upgrade Kit-Lime Hub/6' Cable Mouse/Mousepad	$59.99*
#43773	USB Upgrade Kit-Strawberry Hub/6' Cable Mouse/Mousepad	$59.99*
#43775	USB Upgrade Kit-Tangerine Hub/6'Cable Mouse/Mousepad	$59.99*

**Price with purchase of iMac™ or Power Mac G3. Reg price $79.99.*

VIKING COMPONENTS

DON'T FORGET MEMORY!

Upgrades for your iMac

		Was	Now
#34318	32MB Upgrade		$95.99
#34319	64MB Upgrade	~~$145.99~~	$89.99
#34320	128MB Upgrade	~~$319.99~~	$159.99

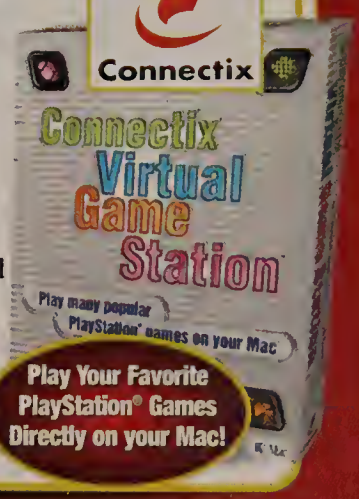
Have your RAM professionally installed by one of our factory-trained technicians for only $30. Ask for #2214. Call us or visit our Web site save big.macmall.com for more Viking memory.

Connectix Virtual Game Station

$48.99 #43332

with Ariston "Hermes" Gamepad $69.99 #45484

The number of compatible games increases daily. For more info and restrictions, call or visit savebig.macmall.com



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Most Powerful, Best Graphics & Most

Save an additional $100

PowerMac G3 + Apple Studio 17" Display = Savings!

FREE Memory o

Apple Studio 17" Display only $499.99 #42243

Buy any Power Mac G3 and the 17" Studio Display and get $100 Cash Back!

- Superb screen quality ➤ 17" (16.0 viewable)
- 1600x1200 @ 60Hz ➤ .25mm dot pitch
- Vertically flat for reduced glare
- Elegant translucent case

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Check out our Web site for the latest computer deals!

Mfr. Mail-in offer valid 4/2/99 - 6/27/99. CPU and Display must appear an the same invoice

Best Data USB Modem

- SmartOne 56K V.90 Ext. Modem for USB

For more info visit www.savebig.macmall.com

Best Data USB Modem $99.99 #42252

MACMALL EXCLUSIVE!

Instant Cash Back!

$100 off	All products in this advertisment priced between $1,597 & $2,499
$150 off	All products in this advertisment priced between $2,500 & $2,999
$200 off	All products in this advertisment priced between $3,000 & $3,499
$250 off	All products in this advertisment priced between $3,500 & $4,396
$300 off	All products in this advertisment priced between $4,397 & up

No coupons to mail in. No checks to wait for. Just instant savings! Best of all, there is no limit— so order as many times you want, and keep saving! Cannot be combined with free memory promo. Sorry, PowerBooks do not qualify for rebates.

The most powerful, expandable, *revolutionary* Mac ever built!

You could say it's like getting twice the computer at half the price—but it's more than that! The new Power Mac G3 isn't just a re-design. It's a revolution. With greater processing power. Cutting-edge connections. Easy access inside and out. Remarkable affordability. And a fresh, new look inspired by the iMac. Put simply, it's faster, smarter, and easier to own than anything out there!

A new standard in speed and design!

Outrageous performance.

- PowerPC G3 processor running at 300, 350 or 400MHz
- Supports up to 1GB of low cost, high performance PC100 SDRAM
- Up to 1MB of performance-boosting backside cache running at up to 200MHz
- System bus running at 100MHz (instead of the 66MHz bus on earlier models) boosts performance speeds, reduces bottlenecks
- 6 or 12GB Ultra ATA hard disks or a 9GB Ultra2 LVD SCSI hard disk
- Support for hard disk storage up to a staggering 100GB
- Built-in 10/100BASE-T Ethernet networking; optional Gigabit Ethernet

Advanced capabilities.

- Two high speed FireWire ports for digital video and still cameras, printers, scanners and other multimedia peripherals
- Two USB ports for keyboards, mice, printers—up to 127 devices at once
- Four PCI slots running on a 100MHz system bus—50% faster than in previous Power Macintosh G3 computers (three 64-bit slots and one 32-bit for ATI card)
- Two additional bays let you store over 100GB internally

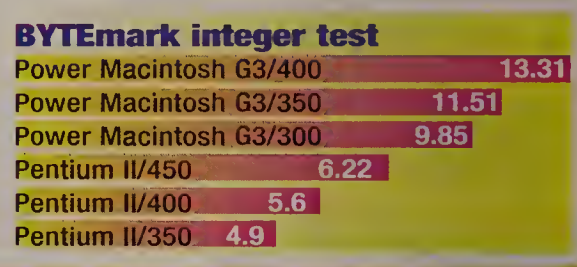
Design elegance.

- Translucent case, inspired by the iMac
- Easy, drop down accessibility for installing cards, drives, and memory
- Convenient, built-in handles for easy carrying

Great graphics and video features.

- ATI RAGE 128 Graphics Accelerator provides incredible 2D/3D performance for graphics intensive games
- 16MB SDRAM video memory
- Built-in FireWire—allows you to transfer video directly from your digital video camera for digital editing with virtually no loss of quality

BYTEmark integer test



MACMALL EXCLUSIVE!

FREE Up to 128MB RAM with your Power Mac® Purchase! A $309.99 Value!

$30 installation fee applies. Cannot be combined with instant cash back promo.

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**Free Iomega Zip Drive or 56K Modem promotions is a mfr. mail-in offer valid 4/2/99-6/27/99 or while supplies last.*

Order Any Time. Open 24 Hours.

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Order Today by 10pm EST—Get it Tomorrow by 10:30am

Expandable!

Cash! Plus FREE Zip Drive or 56K Modem!

Authorized Catalog Reseller

Complete your Power Mac G3 system with a stunning new display! Apple's new 17" and 21" Studio Display monitors mount on a space-saving tripod—you can stow your keyboard underneath it when not in use! Monitor sold separately.

FREE
56K Modem or Iomega Zip Drive w/your PowerMac G3 purchase!*
PLUS! FREE
to 128MB RAM or Instant Cash Back!
Plus! Save an additional $100!
See left for details!
Only from MacMall!

For more peripherals, USB 8 UNIVERSAL SERIAL BUS *call or visit our Web site!*

Only $1,598
#44237
or lease for as low as $64 per month
Check out our Web site for the latest computer deals!
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New Power Mac G3s!

	EXTRA 64MB FREE! Or instant Cash Rebate!	EXTRA 64MB FREE! Or instant Cash Rebate!	EXTRA 64MB FREE! Or instant Cash Rebate!	EXTRA 128MB FREE! Or instant Cash Rebate!
Order	#44237	#44239	#44241	#44242
MHz	300	350	350 w/Zip Drive	400
RAM	64MB	64MB	128MB	128MB
HD	6GB Ultra ATA	6GB Ultra ATA	12GB Ultra ATA	9GB U2 LVD S
Cache	512K @ 150MHz	1MB @ 175MHz	1MB @ 175MHz	1MB @ 200MHz
CD/DVD-ROM	24X CD-ROM	DVD-ROM	24X CD-ROM	24X CD-ROM
Price	$1,598	$1,998	$2,498	$2,998
Lease	$64/mo.	$80/mo.	$100/mo.	$120/mo.

Call for details on our low lease rates!

VIKING COMPONENTS

DON'T FORGET MEMORY!
Upgrades for your Power Mac Yosemite G3

#42223	32MB PC100 DIMM	$85.99
#42224	64MB PC100 DIMM	$145.99
#42225	128MB PC100 DIMM	$309.99
#42226	256MB PC100 DIMM	$1,239.99

Have your RAM professionally installed by one of our factory-trained technicians for only $30. Ask for #2214. Call us or visit our Web site savebig.macmall.com for more Viking memory.

Call for Even Lower Prices!

See our Web site for more deals!
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PowerBooks starting at $1,998!

PowerBook Essentials!

ix3D Road Rocket!

- True 128-bit architecture for awesome graphics performance!

For more info visit www.savebig.macmall.com

Road Rocket
~~$249.99~~
#33200
Call for even lower price!

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TARGUS A TRADITION OF EXCELLENCE

Get $20 off the price of this new Targus leather Notebook case when you order it with any notebook in this catalog.

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Notebook Carrying Case
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DEFCON 1 Notebook Security System

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Prevent notebook theft with this lightweight cable with 110 decibel alarm. Its built-in motion sensor will alert you if someone tries to steal your notebook or briefcase.

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A 10/100 PC Card Specifically for Your G3!

- 32-bit card bus
- Auto-selects a 10BT or 100BTX network

For more info visit www.savebig.macmall.com

MPC200 or 10/100 PC Card Adapter
$128.99
#36755

Name Brand Accessories

Make your PowerBook G3 totally portable with these name-brand accessories!

#31413	Apple AC Adapter	$74.99
#31414	Apple Floppy disk drive	$99.99
#31412	Apple Lithium-Ion battery	$199.99
#36451	BookEndz docking station for PowerBook G3 Series	$199.99
#43110	**NEW!** DVD-Video Kit	$499.99

PowerBook Price

Blazing Speeds up to 300MHz!

These PowerBooks are the sleekest, fastest, best-equipped notebooks you've ever seen! With the high-performance G3 processor, they outperform comparable Pentium and Pentium II processor-based desktop systems, with go-anywhere, do-anything PowerBook convenience. Order the fastest performance ever in a notebook computer!

Stellar Features at an Affordable Price!

Processor and Memory

- 233, 266 or 300MHz PowerPC G3 processor–fastest performance ever in a notebook!
- 66MHz system bus speed
- Integrated floating point unit and 64K on-chip Level 1 cache (32K for data and 32K for instruction)
- 32 or 64MB RAM; 2 SO-DIMM slots support up to 192MB RAM; 4MB ROM

Storage

- 2, 4 or 8GB IDE hard drive
- 20X CD-ROM drive for use in expansion bay (comes w/DVD drive #42622)
- Removable 1.44MB floppy disk drive for use in expansion bay (see grid for details)

Expansion & Networking Ports

- Two hot-swappable expansion bays
- ADB port, SCSI port, Serial port
- Built-in 10BASE-T Ethernet
- RJ-11 modem port, 4Mbps Infrared (IrDA) port
- PC Card Slots for two Type II or one Type III PC Card

Graphics, Video & Sound

- Features high-quality display, up to 14.1 inches (diagonal)
- 2 or 4MB SGRAM video memory
- Up to 14.1 inch (diagonal) displays feature built-in TFT XGA active matrix displays, supporting millions of colors at 1024 x 768 pixel resolution
- 2D/3D graphics, through integrated video controller
- S-video output for connecting to a TV (13.3" & 14.1" displays only)
- 16-bit CD quality stereo input/output
- Two built-in stereo speakers

Portability

- Includes one Lithium-ion battery for up to 3 hours of normal use; supports two batteries for as much as 7 hours of use

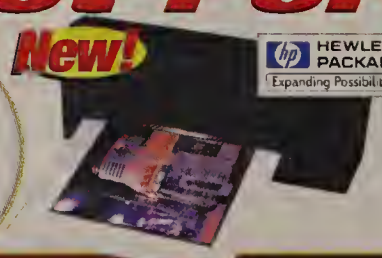
Software

- Mac OS 8.5

Hot Peripherals!

HP DeskJet 340 w/Mac Adapter
~~$199.99~~
#74711
Call for even lower price!

New!



HEWLETT PACKARD Expanding Possibilities

Internal Zip Drive for PowerBook G3
~~$189.99~~
#32071
Call for even lower price!

(w/PowerBook purchase. Reg. price is $219.99 #31871)

Order Any Time. Open 24 Hours.

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Order Today by 10pm EST—Get it Tomorrow by 10:30am

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Drops up to $1010!

Only $1,998

While supplies last! #44230

or lease for as low as $80 per month

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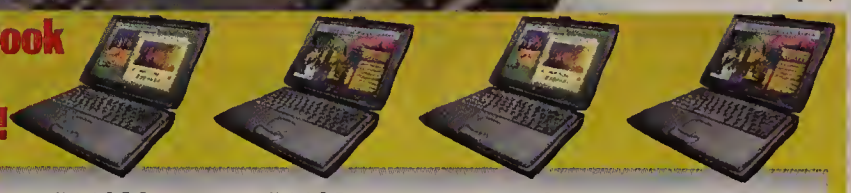
Faster than ever and elegantly equipped! Choose a G3 PowerBook up to 300MHz, with an optional DVD drive and a luxurious, 14" display!

PowerBook Prices Slashed!



Order	#44230	#44231	#44232	#44233
MHz	233	266	300	300
RAM	32MB	64MB	64MB	64MB
HD	2GB	4GB	8GB	8GB
Cache	512K	1MB	1MB	1MB
CD-ROM	20X	20X	20X	DVD
Modem	56K	56K	56K	56K
Display	14.1" Active matrix	14.1" Active matrix	14.1" Active matrix	14.1" Active matrix
Weight	7.8lbs.	7.8lbs.	7.8lbs.	7.8lbs.
Was	~~$2,298~~	~~$2,998~~	~~$3,998~~	~~$4,398~~
Now	$1,998	~~$2,638~~	~~$2,988~~	~~$3,438~~
YOU SAVE	$300	$360	$1010	$960
Lease	$80/mo.	$106/mo.	$120/mo.	$138/mo.

Call for details on our low lease rates!

VIKING COMPONENTS

DON'T FORGET MEMORY!

Upgrades for your PowerBook

#31437	16MB PowerBook G3	$55.99
#31438	32MB PowerBook G3	$89.99
#31440	64MB PowerBook G3	$159.99
#31442	128MB PowerBook G3	$325.99

Have your RAM professionally installed by one of our factory-trained technicians for only $30. Ask for #2214. Call us or visit our Web site at savebig.macmall.com for more Viking memory.

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Call for Even Lower Prices!

See our Web site for more deals!
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If You Don't See it,

USB Peripherals for the iMac and New Power Mac G3s!

MICRO CONNECTORS, INC.

Teal Blue USB Upgrade Kit

Includes Hub, 6' Cable, Mouse and Mousepad. All iMac colors available.

$59.99
#43772
With iMac or Power Mac G3 purchase.
Reg. price $79.99.

Epson Stylus® Color 740i USB Printer

EPSON

Customize to match your iMac!

The perfect color match to your iMac or Power Mac G3!

- 1440 x 720dpi
- 6ppm black, 5ppm color

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MICROTEK Better Images Through Innovation

Microtek ScanMaker X6 USB Scanner

MICROTEK ScanMaker X6

- 36-bit color
- 600dpi x 1200dpi

only
$99.99
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Iomega® 100MB USB Zip® Drive

Enjoy unlimited storage capacity & easy USB connectivity! Easy to connect, hot-swappable, translucent blue.

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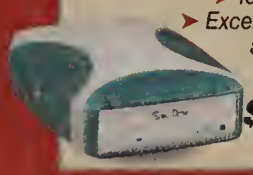
¡Que! Drive 4x2x8 CD-Rewritable Drive for the iMac™

- The revolutionary USB interface CD-Rewritable Drive
- Three drives in one
- Ideal for data archiving
- Excellent addition for MIDI and recording studios
- Translucent Blue



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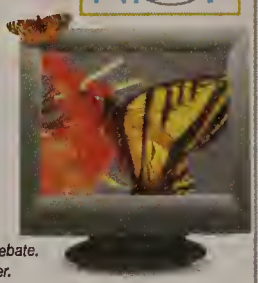
K7 17" Color Display

KIER

- 17" (16.3" viewable)
- .28mm
- Max resolution 1152 x 870



only
$179.99
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Limit 1 rebate per customer.

HP LaserJet 5M Printer

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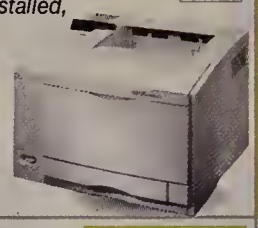
1 YEAR WARRANTY

- 600dpi up to 12ppm
- 35,000 page/month duty cycle
- Genuine Adobe PostScript L2
- Ethernet Card installed, Mac and PC



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While supplies last!

Blowout! Portable PalmPilot Professional with Mac Converter Kit

3Com

only
$159.99
#88147
While supplies last!

ORB 2.2GB SCSI Removable External Drive

CASTLEWOOD

- Faster than many hard drives
- 10ms seek time, 5400rpm
- Unlimited capacity w/ additional 2.2GB storage
- Ultra SCSI Interface

New!

$199.99 #44042
Limited quantities available—
Reserve yours today!

Rewrite CDs Again and Again!

LACIE

2x/6x/2x External CD-ReWritable Drive

- Reads CD, CD-Audio, CD-R or CD-RW

NEW LOW PRICE!

only
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#37069
While supplies last!

New Palm V™ Mac Organizer

3Com

- Palm computing platform device
- Smaller, sleeker, lighter weight
- New, clearer screen display

Palm V Connected Organizer

only
$457.99
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Epson Stylus® Photo 750 Printer

EPSON

- 1440 x 720dpi; 6-color (PRQ™) Quickdry inks
- Ultra small ink droplets (6 picoliters)
- Fast! Prints 4" x 6" photos in 1 minute
- USB, parallel & serial ports

only
$299.99 New!
#44849

Epson Stylus® Color 3000 Printer

EPSON

- Present full-bleed 13" x 19" designs at 1440 x 720dpi
- Includes Adobe PostScript L2
- Optional internal Ethernet, Mac & PC

1 YEAR WARRANTY

only
$899.99
#43864
Mfr. refurbished.
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New Low Price on the Zip® 100MB Drive!

Share data with 20 million other Zip® Drive users! 100MB External SCSI Zip® Drive

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$99.99
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OLYMPUS DIGITAL VISION

$100 Price Drop!

- 1280 x 960 resolution
- Two 4MB SmartMedia cards

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Astra 610s Scanner

UMAX

BLOWOUT!

- 30-bit
- 300x600dpi optical, 4800dpi enhanced
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- Includes Adobe PhotoDeluxe™

INCLUDES!

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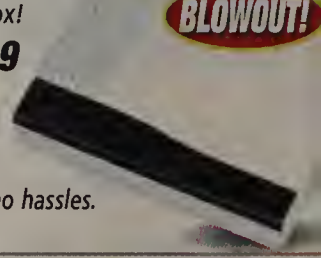
SPECIAL! 56K V.90 External Modem

Get V.90 right out of the box!

BLOWOUT!



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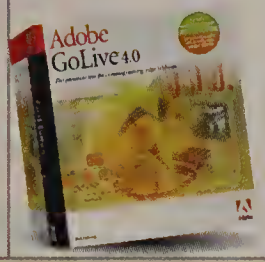

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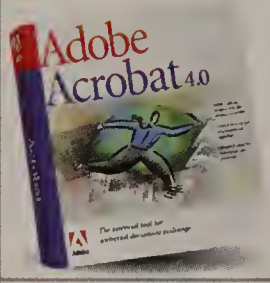

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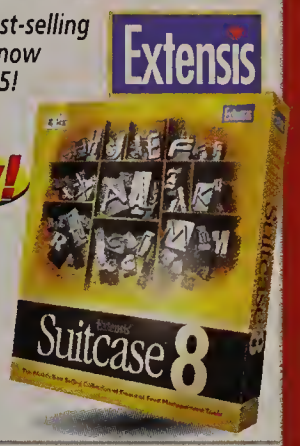

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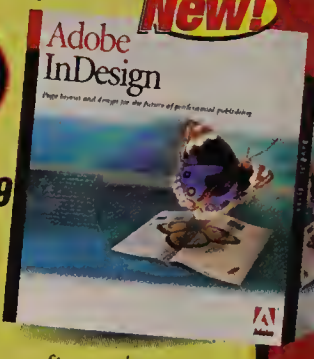

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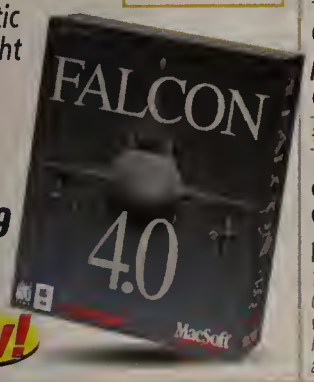

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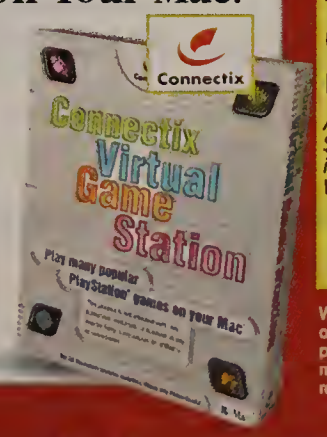

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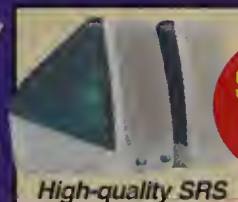

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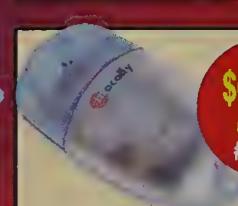

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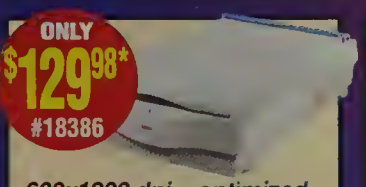

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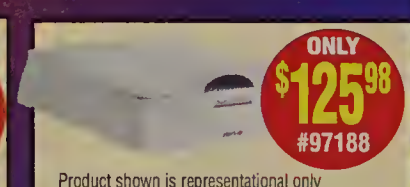

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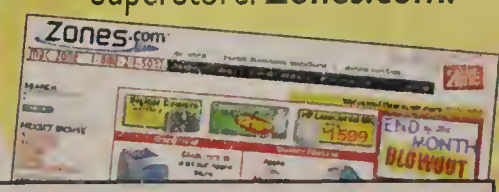

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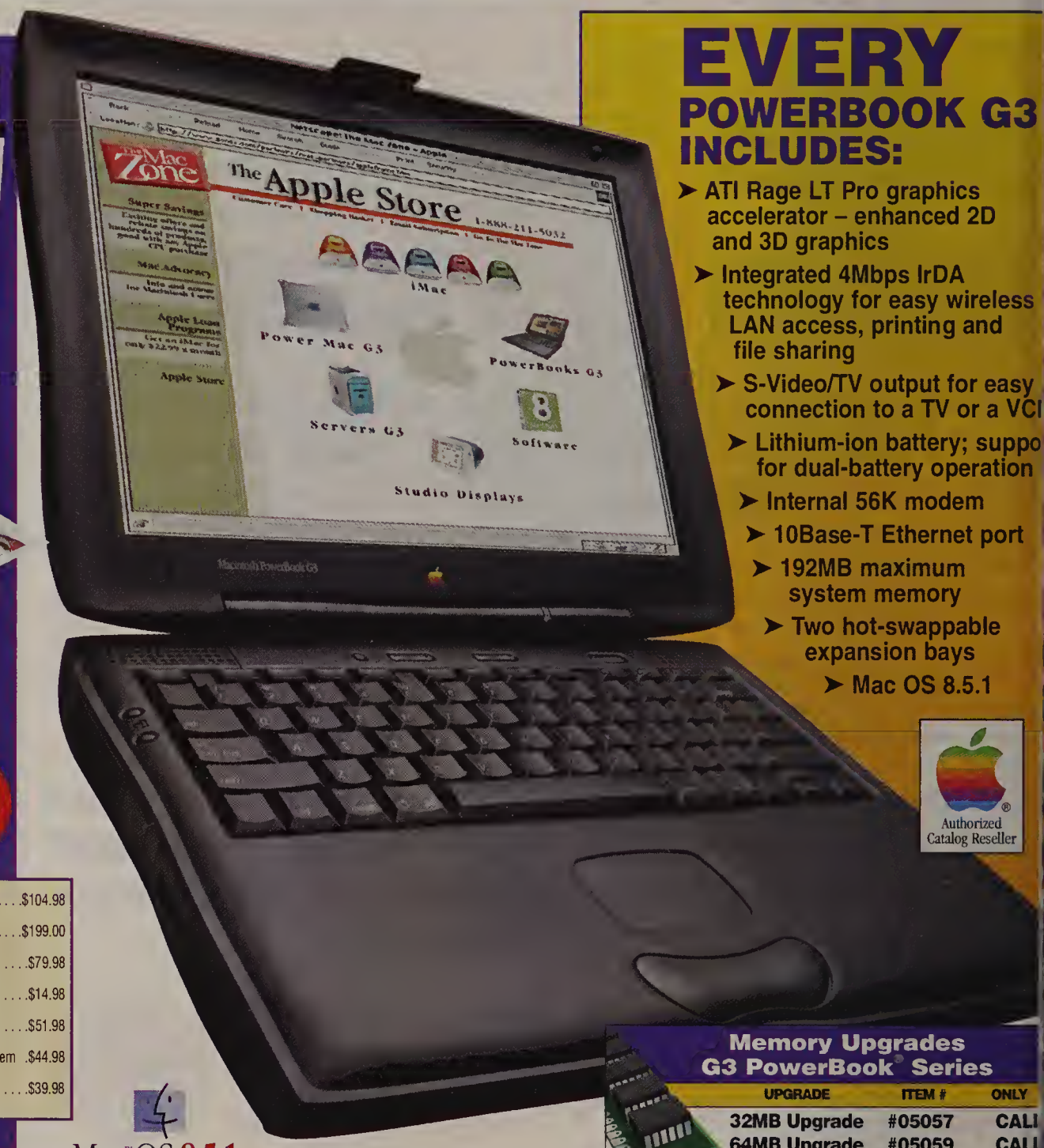

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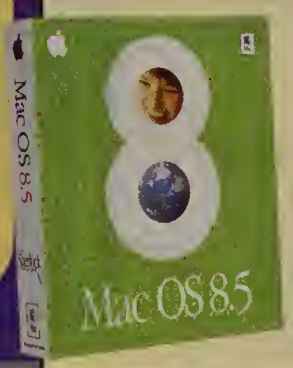

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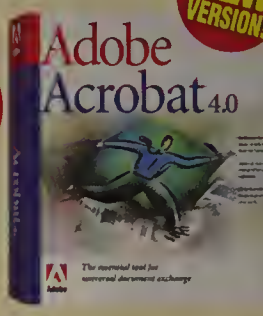

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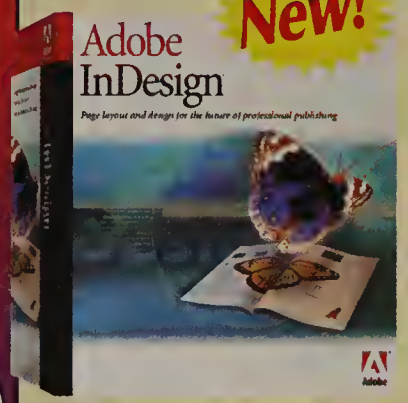

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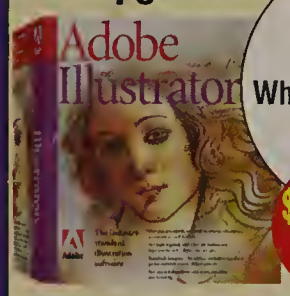

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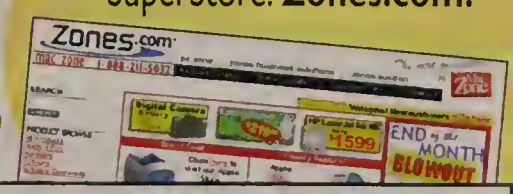

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100MB Zip USB Drive

Only $129.95! DR9464

New!

- Translucent ice blue
- USB compatible, works with your iMac!

Iomega 100MB Zip Disks

Only $8.99! each, in 60-pack (gray) BN6205

Gray 100MB Zip Disk 10-pack
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Multi-color 100MB Zip Disk 10-pack
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Together for only $769.95! DTP0688

Save over $350!*

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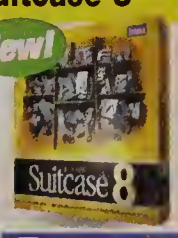


- Add fonts from the finder
- Organize fonts by project
- Create and output QuarkXPress files without missing fonts

Extensis

PAGE 1 OF 8

FREE* 64MB RAM

with the purchase of any qualifying Power Mac G3!

MacWAREHOUSE Special Offer!

Now you can get:
FREE* 64MB RAM (a $199.95 Value!†)
or an Instant Rebate
Call for details!

PLUS:

get a FREE** Internal Iomega Zip Drive or FREE** Apple 56K Internal Modem!
with the purchase of any qualifying Power Mac G3!

Model shown is CPU1284.

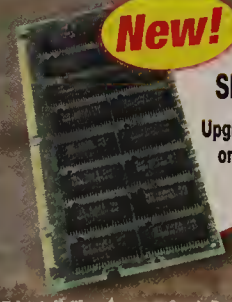
Apple Display

Additional $100 Rebate!
when you purchase a 17" Apple Studio Display and any qualifying Power Mac G3 together**

Apple 17" Studio Display
17" screen (16.0" viewable)/.25mm dot pitch/
1600 x 1200 @ 60Hz
Item # MON0786 ..... only $499!

New!

32MB PC100 SDRAM G3 Memory
Upgrade only $99.95 each Item # CHP0690
For New Power Mac G3s with 100MHz bus speed.



New!

Apple 56K‡ Internal Modem
Only $109.99!
Item # DMD4229
• 56K modem with FaxSTF

*$29.95 installation fee required. Reconditioned systems do not qualify. Limited time offer. Call for details.
†Value based on MacWAREHOUSE pricing as of this magazine printing.
‡Capable of receiving at 56Kbps. Actual send and receive speeds may vary.
**Buy any qualifying Power Mac G3 and receive a FREE Internal Iomega Zip Drive or FREE Apple 56K Internal Modem. Zip drive or modem will be sent to you directly from Apple. Allow 6-8 weeks for delivery. Good for purchases between 4/2/99 and 6/27/99. Visit warehouse.com/rebate/apple for coupon, or call us at 1-800-390-0706 to ask for one. Offer not valid on purchase of reconditioned models. Limited time offer. Call for details.

- Our sales staff is ready to take your order 24 hours a day, 7 days a week. We accept the following major credit cards: Visa, MasterCard, Discover Card/NOVUS, AmEx. Your credit card will not be charged until each item is shipped (no surcharge). CT, NJ and OH residents add applicable sales tax.
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- Orders for "in-stock" items placed on weekdays up until 12:00 midnight (E), 10:00 pm (E) for Internet orders, ship same day for overnight delivery (barring system failure, etc.). We anticipate being able to ship "out-of-stock" items within 30 days.
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Power Mac G3/300MHz Minitower. See left page for details.

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All Power Mac G3s include:

- Up to a 400MHz PowerPC G3 processor
- Up to 1MB Backside Level 2 Cache
- ATI RAGE 128 graphics card with 16MB of graphics memory
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- 24x max. CD-ROM drive or DVD-ROM drive (on model CPU1283/CPU1333)
- 10/100Base-T Ethernet
- Two FireWire ports
- 2 extra bays/ 4 PCI slots

Power Mac G3s starting at $1599!

Additional $100 Rebate! when you purchase a 17" Apple Studio Display and any qualifying Power Mac G3 together††

Monitor sold separately.

Model shown is CPU1284.

		Regular MacWAREHOUSE Price	Price with Free* 64MB RAM
300MHz PowerPC G3/ 64MB SDRAM/6.0GB HD/24x max. CD-ROM drive/512K Backside Level 2 Cache	LeaseIt! for $56/mo.§	$1599 Item # CPU1282	$1628.95 Item # CPU1332
350MHz PowerPC G3/64MB SDRAM/6.0GB HD/ DVD-ROM drive/1MB Backside Level 2 Cache	LeaseIt! for $69/mo.§	$1999 Item # CPU1283	$2028.95 Item # CPU1333
350MHz PowerPC G3/128MB SDRAM/12.0GB HD/24x max. CD-ROM drive/Zip Drive/1MB Backside Level 2 Cache	LeaseIt! for $87/mo.§	$2499 Item # CPU1284	$2528.95 Item # CPU1334
400MHz PowerPC G3/128MB SDRAM/9.0GB Ultra2 SCSI HD/ 24x max. CD-ROM drive/1MB Backside Level 2 Cache	LeaseIt! for $104/mo.§	$2999 Item # CPU1285	$3028.95 Item # CPU1335

††Items must appear on same invoice. Offer expires 6/27/99. Visit warehouse.com/rebate/apple for coupon, or call us at 1-800-390-0705 to ask for one.

ASANTÉ AsantéFast 10/100 Adapter

Only $49.99! DEC3343

- 10/100 PCI adapter (Mac/PC)
- Auto negotiation

10/100 PCI Adapter 5-pack (Mac/PC) Item # DEC3344, only $239.99

Mactell Vision 3D Pro Graphics Accelerator

Only $129.95! DRI3259

- High end 8MB accelerator with 64 bits data bus
- Rave, OpenGL, Quicktime and Quickdraw 3D support

mactell

Epson Stylus Color 900 Printer

10ppm Color!

Only $449.95! PR14811

- 12ppm black; 10ppm color
- 1440 x 720 dpi
- Smallest ink droplets
- Optional networking

EPSON

Nikon CoolPix 950 Digital Camera

New!

Only $949.95! IN7755

- 2" color LCD • 3X optical zoom
- 2.11 million pixel 1/2" CCD
- 8MB compact flash stores up to 128 standard images

Nikon

4x4x16 max. CD-RW Drive

Only $449.95! DRI2953

- 16X max. reading speed
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- 160ms access time
- 2MB RAM

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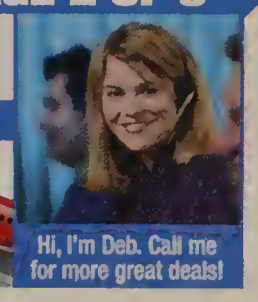

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NEW! Blazing fast 333MHz

Apple • Epson • Iomega • Hewlett-Packard • Umax • Kensington • Belkin

Epson Stylus Color 740 Printer

Only $249.95! PR14065

- 1440 x 720 dpi w/smaller ink drops
- 6ppm black; 5ppm color
- USB/Mac serial compatible

EPSON

iMac Add-on!

Iomega Zip® USB Value Pack

Only $249.95! BND3035

Includes:
- Translucent blue Zip drive
- 10 color disks
- Carrying case
- Disk caddy
- Media wallet

iMac Add-on!

iomega

NEW! HP DeskJet 882c Color Printer

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HEWLETT PACKARD Expanding Possibilities

- USB compatible only
- 8ppm black; 5ppm color
- PhotoRet II technology

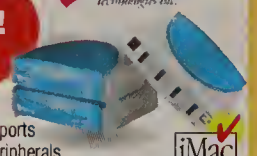
USB compatible

iMac Add-on!

iMac USB Hubs

As low as $79.99! DEH4075

entrega. technologies



- Provides 4 to 7 additional USB ports for expanding your peripherals.
- Matching iMac color case

iMac Add-on!

DEH4075: 4-port USB iMac hub.....$79.99
DEH4074: 7-port USB iMac hub.....$99.99

Astra 1220u Duo Color Scanner

USB compatible

Only $129.95! IN7260

UMAX

Was $149.99

- 600 x 1200 dpi resolution
- 36-bit with 10-bit A/D converter

NEW LOW PRICE!

iMac Add-on!

NEW! iMac/333MHz — available in 5 colors!

iMac 233MHz BLOWOUT!

Now only $899!

Ask for item # CPU1260. While supplies last!

iMac 233MHz/4.0GB HD/original Bondi Blue
Ask for item # CPU1260 ..Leaselt! for only $32/mo.§ **Only $899** While supplies last.

iMac 233MHz/4.0GB/original Bondi Blue with additional 64MB RAM (not installed)
Ask for item # CPU1261 ....Leaselt! for only $37/mo.§.... **only $1068.95** While supplies last.

iMac 233MHz/4.0GB/original Bondi Blue with additional 64MB RAM INSTALLED
Ask for item # CPU1262 ....Leaselt! for only $38/mo.§ .... **only$1098.90** While supplies last.

NEW— iDock!

Adds Serial and Parallel ports to your iMac!

NEW! iDock, from CompuCable, expands iMac's connectivity. iDock is a swivel base with an Integrated 3-port USB Hub plus 2 Apple Serial/Geo Ports and 1 Parallel Port. With iDock, iMac can be connected to native Mac serial devices and multi-platform parallel devices. iDock is molded in Bondi Blue to match iMac perfectly.

Ask for item # DEH4254 ..... **$199.99**

CompuCable iSpeakers for iMac
Ask for item # EX9774 ..... **$34.99**

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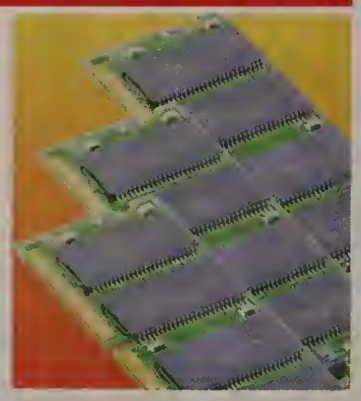
IMAC G3 MEMORY

32MB SDRAM
Only $99.95!
Item # CHP0658

- 66MHZ
- 144 PIN SODIMM



CHP0657: 64MB ..... **only $169.95**
CHP0659: 128MB ..... **only $299.95**

MYST

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A $29.95!** Value

- Challenge your puzzle-solving skills in the Island world that is Myst!

FREE with any purchase from MacWAREHOUSE*
Item # AAA0742

*$3.95 shipping and handling applies. Shipped in promotional packaging. Hurry! Offer good while supplies last.

iMac Add-on!

PAGE 3 OF 8

ORBIT USB FOR MAC

Only $49.95! with iMac or USB Power Mac G3 purchase
Ask for item # INP1761.

iMac Add-on!

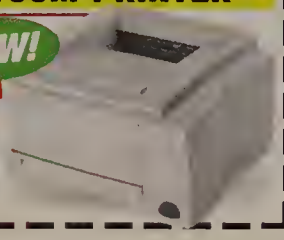
KENSINGTON

- Designed specifically for use with USB
- Fits the natural shape of your hand

USB compatible

HP LASERJET 2100M PRINTER

Only $795.95! NEW!
Ask for item # PR14691.



- 1200 dpi
- 10ppm
- Mac LocalTalk connectivity

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iMAC ACCESSORY KIT

iMac Add-on!

Only $49.99!
Ask for item # DSP1642.

Save $30!**

- **Includes:** SurgeMaster surge suppressor, iMac CD holder (holds 10 CDs), ErgoPad Premiere wrist rest, ErgoPad Premiere mousepad.

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Apple iMac G3s!

See below for details.

CALL FOR A FREE FULL-COLOR CATALOG!

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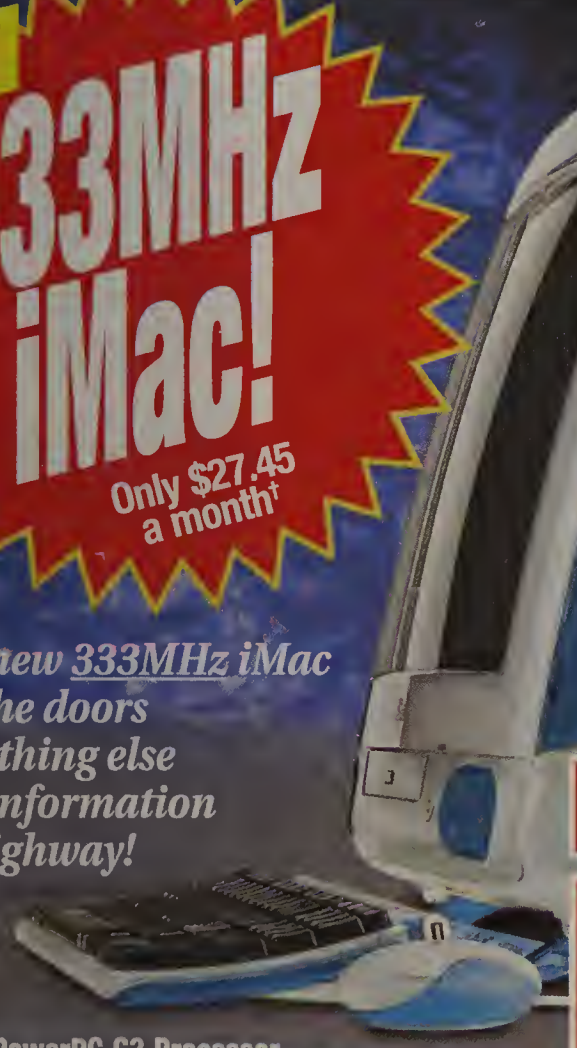
333MHz iMac!

Only $27.45 a month†

Brand new 333MHz iMac blows the doors off anything else on the information superhighway!



- 266MHz PowerPC G3 Processor
- Built-in 15" Color Monitor (viewable size: 13.8")
- 32MB (256MB max.) • 6.0GB hard drive
- 512K Backside Level 2 Cache • 6MB of Video RAM
- Built-in 24X CD-ROM drive
- Built-in 56Kbps Modem • Mac OS 8.5
- Built-in 10/100Base-T Ethernet

See the complete line of G3s at
www.apple.warehouse.com

Visit us at:
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for our full selection of great games for the Mac!

Blueberry: *item # CPU1336!*
Grape: *item # CPU1337!*
Lime: *item # CPU1338!*
Strawberry: *item # CPU1339!*
Tangerine: *item # CPU1340!*

Only $1199 each

Lease it! for only $42/mo.‡

‡7 monthly payments of $27.45. 14.89% Annual Percentage Rate subject to increase or decrease. Payments deferred for the first 120 days subject to interest of $32.71 and a loan origination fee of $49.96 charged on day 91. No prepayment penalty. Subject to approval of credit. Based on Estimated Retail Price of $1,199. Tax and shipping not included.

iMac SuperDisk USB Drive

Only $149.95!
DRI2793

- 120MB capacity
- USB interface for easy plug and play, hot-swappable storage
- Reads and writes 3.5" diskettes

iMac Add-on!

Imation LS-120MB SuperDisks as low as $7.99 each in 10-pack with drive purchase. Ask for item # BND3240.

EtherMac iMac iPrint Adapter

with built-in PhoneNet!

Only $109.99!
DEP1734

- Connects your iMac to LocalTalk printers and other Macintosh computers
- Easy plug-and play installation

iMac Add-on!

Agfa 1212u Scanner

MacWAREHOUSE Exclusive $30 rebate!

Only $99.95!*

after MacWAREHOUSE $30 rebate with the purchase of an iMac or Apple Power Mac G3. Item # IN7659.

- Translucent blue! • 36-bit color • USB

*Price before rebate is $129.95. Offer expires 5/31/99. Rebate coupon available at www.warehouse.com/rebate/snapscan, or ask for coupon # AA1429. While supplies last.

iMac Add-on!

USB

Connectix Virtual Game Station

Only $49.95!
ENT1695

- Install the Connectix Virtual Game station on your G3 Mac* and you're ready to play!
- Saves games in progress
- Supports two players

*Not compatible with G3 upgrade cards

iMac Add-on!

PowerPrint USB to Parallel Kit

Save $30!**

Only $69.95!*
w/iMac purchase
AAP0586

- Print from your USB Mac to hundreds of inkjet and laser printers, including PC compatible printers!

*Save $30 when purchased with an iMac. Products must appear on same invoice. While supplies last.

iMac Add-on!

MICROSOFT OFFICE 98

Microsoft®

- Includes: Word 98, PowerPoint 98, Excel 98 and Outlook Express

Upgrade only
$259.95!
Item # UPG0778

BUS1150: Microsoft Office 98 Full Version ..... only $449.95

VIRTUAL PC 2.1 WITH WINDOWS 98

- Includes Microsoft Windows 98 full version!
- Fully integrated with Mac OS 8 and OS 8.5
- NEW 56K modem speed support!

Only $129.95!*
After $40 mail-in rebate.

COM1039: Virtual PC 2 with Windows 98 Full Version ..... only $129.95*
COM0951: Virtual PC 2.1 with Windows 95 ..... only $149.95
COM0952: Virtual PC 2.1 with PC DOS CD ..... only $49.95
UPG0810: Virtual PC 2.0 with Windows 95 Upgrade ..... only $39.95

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Apple PowerBook G3

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PowerBook G3 Floppy Drive

Only $109.95! DRI2661

- Hot swappable slots with plug and play!

Newer BookEndz PowerBook Docking Station

Only $239.95! DRI2765

- Easily connect your PowerBook to your desktop peripherals
- Works with 1998 PowerBooks

PowerBook sold separately.

VST PowerBook G3 Battery

Only $179.95! ACC3403

- Works with 1998 model G3 PowerBooks
- Lithium-ion battery

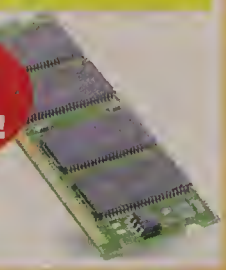
56K V.90 FaxModem PC Card

Only $159.99! DMD3824

- K56 Flex and V.90 technology
- Send, receive, view, print, and manage faxes right from your PowerBook

PowerBook Memory Upgrades

Call For Our Latest Low Prices!



- Installation available
- SDRAM
- 144 Pin DIMM

Apple PowerBook Prices Slashed

PRICE SLASHED $500!

Now only $1999!

WAS $2499. ASK FOR ITEM # CPU1238.

Leaselt! for $69/mo.§

- 233MHz PowerPC G3 processor • 32MB SDRAM
- 2.0GB hard drive • 20X CD-ROM drive
- 56K modem • 10Base-T Ethernet
- 512K Backside Level 2 Cache
- 14.1" active-matrix color display

While supplies last!

233 MHz!

32MB G3 MEMORY UPGRADE for PowerBook only $159.95! Ask for item # CHP9820.

Floppy drive sold separately.

APPLE POWERBOOK G3/266MHZ

- 266MHz PowerPC G3 processor
- 64MB SDRAM • 4.0GB hard drive
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- 10Base-T Ethernet
- 1MB Backside Level 2 Cache
- 14.1" active-matrix color display

PRICE SLASHED $300!

Now only $2699!

was $2999

Item # CPU1239

Leaselt! for only $94/mo.§

While supplies last!

Floppy drive sold separately

APPLE POWERBOOK G3/300MHZ

- 300MHz PowerPC G3 processor
- 64MB SDRAM • 8.0GB hard drive
- 20X CD-ROM drive • 56K modem
- 10Base-T Ethernet
- 1MB Backside Level 2 Cache
- 14.1" active-matrix color display

PRICE SLASHED $1000!

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Floppy drive sold separ

APPLE POWERBOOK G3/300MHZ DVD ROM

- 300MHz PowerPC G3 processor
- 64MB SDRAM • 8.0GB hard drive
- DVD-ROM drive • 56K modem
- 10Base-T Ethernet
- 1MB Backside Level 2 Cache
- 14.1" active-matrix color display

PRICE SLASHED $900!

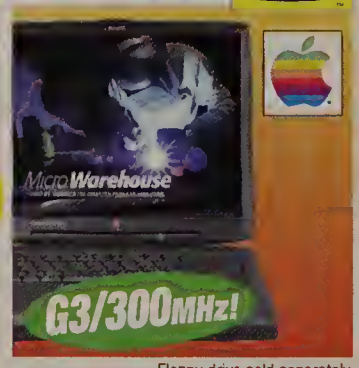
Now only $3499!

was $4399

Item # CPU1240

Leaselt! for only $121/mo.§

While supplies last!



Floppy drive sold separately

NEW! VST ZIP 100 DRIVE

- For PowerBook G3 Series
- Bootable (Mac OS 8 boot disk provided)

Internal as low as $199.95!*

Item # AAP0552

Iomega 100MB Zip disks 6-pack, only $79.95. Item # MED0394.

Apple PowerBook G3 Floppy Drive Only $109.95! Item # DRI2661.

*With the purchase of a 6-pack of Iomega disks. Must appear on the same invoice.

PAGE 5 OF 8

CD-Recordables

IMATION

- 74 min.
- 650MB
- Jewel cases included

As low as 59¢!* each

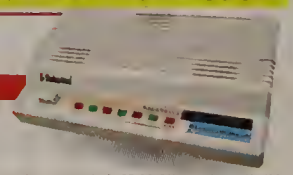
Ask for item # BN5936.

*Price each, after manufacturer's $20 mail-in rebate on 10-pack. Price for 10-pack before rebate is $25.99. Limit 3 rebates per name or mailing address. Offer expires 6/30/99.

3Com U.S. Robotics V.90 56K* FaxModem

Only $97.99!†

Ask for item # BND3179



- Manufacturer's lifetime warranty

*Capable of receiving data up to 56Kbps. Actual send and receive speeds may vary.

†Price after manufacturer's $20 mail-in rebate. Price before rebate is $107.99 Offer expires 6/26/99.

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Free Nova Software 3,000 images** with the purchase of 2 inkjet cartridges.

As low as $15.99! each, in 2-pack

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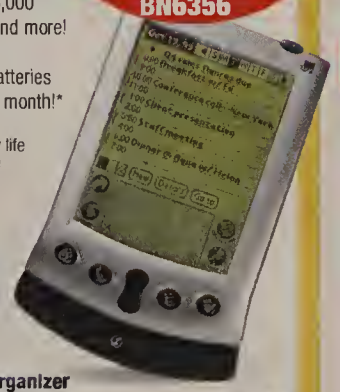

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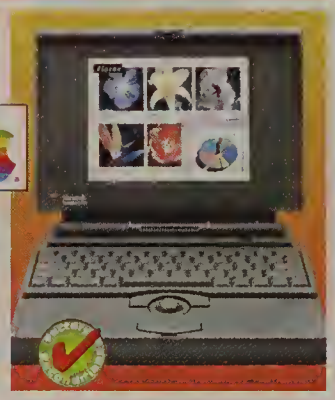

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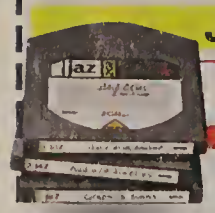

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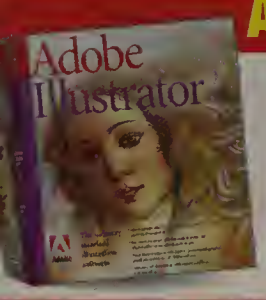

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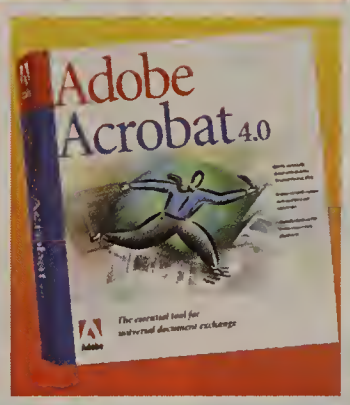

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APS I 4500	IBM Ultrastar, 4357MB, 7200 rpm	259.95	269.95	329.95
APS Q 6400	Quantum Fireball ST, 6236MB, 5400 rpm	359.95	369.95	429.95
APS I 9000	IBM Ultrastar, 8715MB, 7200 rpm	449.95	459	519
APS ST 9000	Seagate Medalist Pro, 9140MB, 7200 rpm	399.95	409.95	469.95
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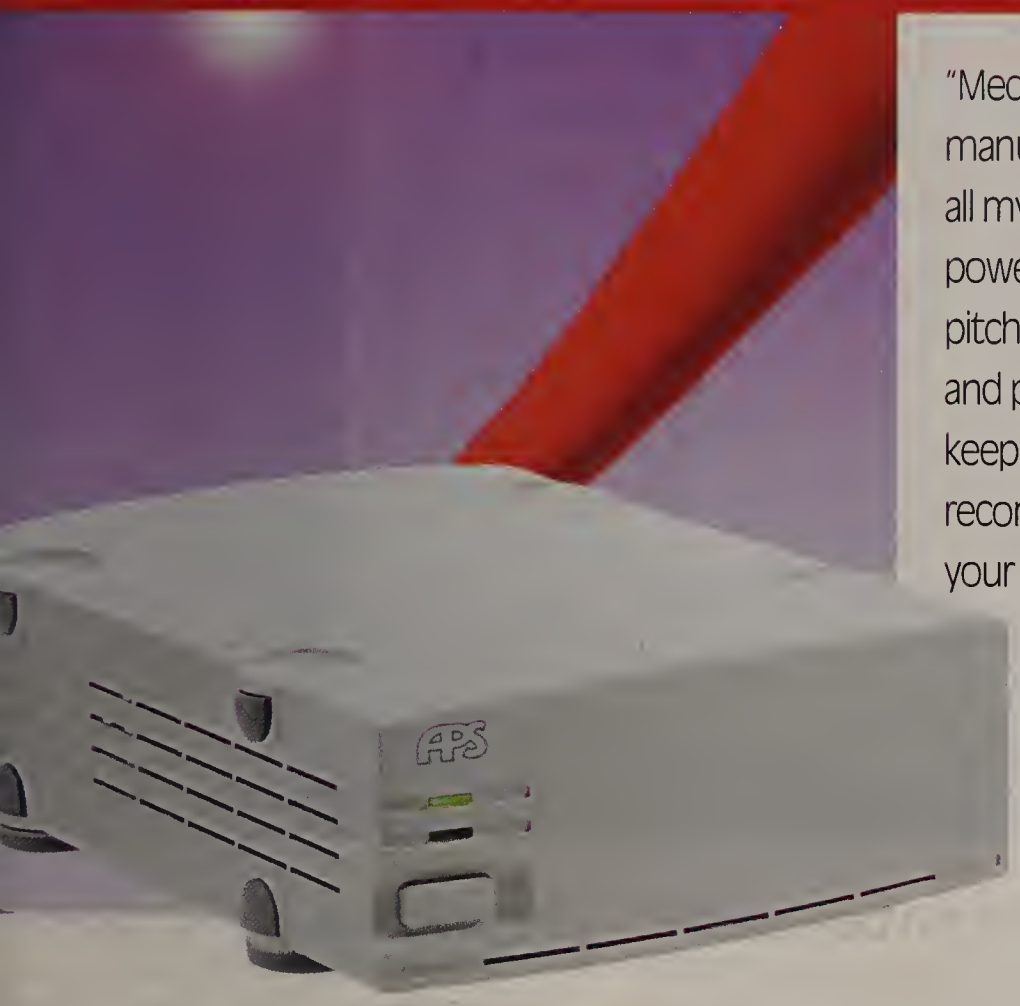

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LACIE EKO 20GB USB	20GB USB External Hard Drive	499.95

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APS I 9000 LVD	IBM Ultrastar 9ES, 8705MB, 7200 rpm	519.95	589.95
APS Q 9000 LVD	Quantum Viking II, 9000MB, 7200 rpm	519.95	589.95
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Dupe discs for only $999.95
External Configuration

APS CD 40

- New 40X CD-ROM whips through challenging multimedia titles, training discs
- Multiread capabilities recognize virtually any disc, including CD-R and even CD-RW
- Includes performance-enhancing software

Now, you can get 40X CD speed at a 36X price. The APS CD 40 gives you the fastest speeds around. But it costs about the same as our previous generation, the CD 36. This new CD speedster handles your most demanding CD-ROM titles with ease. It also reads your custom CD-R and CD-RW discs, so it's perfect for using training discs at the desktop. Shift into high gear with the APS CD 40 today.

Super-speedy CD just $149.95
External Configuration

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This spectacular new storage technology is expected to become the new worldwide standard.

Macworld Exclusive $599.95
External Configuration

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- Safeguards up to 35GB native on AIT Plus tape
- Super-fast backup speeds for mid-range and application server backup, even DV storage

If you thought DLT was your only choice for mammoth backups, think again. The new AIT Plus challenges the DLT70 in both capacity and transfer speeds. Self-cleaning features and low cost of ownership.

Backup faster for $1,999.95
External Configuration

W/2940UW $2,199.95
External Configuration

APS HyperDAT® III

- 12GB native backup for high-end workstations, entry-level networks
- Reliable DDS-3 technology

The APS HyperDAT III provides a cost-effective solution to the backup needs of data-intensive systems. Transfer rates of up to 60MB/s for fast backups

Protect your data for only $979.95
Internal Configuration

APS DLT40

- Super-fast, reliable, high-capacity backup
- Worldwide leader in server, network and enterprise backup
- Protects up to 40GB* of business-critical data at up to 180MB/second

The APS DLT40 gives you network administrators and IT managers the absolute protection you need. And it squeezes backups into the shrinking windows you have. Quit putting up with slow, unreliable backups. Upgrade to the APS DLT40 today.

Peace of mind only $1,999.95
External configuration

APS NS-8

- Protects up to 4GB of critical data (native)
- "...the best back-up solution available for the home and small offices." – Brad Miser, **Using Mac OS 8.5**

The APS NS-8 (the drive formerly known as the APS HyperQIC) is now better than ever. This Travan NS-8/QIC drive now has hardware ALDC compression for faster backups and more efficient data storage. You can safeguard up to 8GB of valuable business or personal files on one tape with the new compression. The APS NS-8 is recommended as the best backup solution for home and small offices in **Using Mac OS 8.5** by Brad Miser. The NS-8 is just as good for Windows users, too.

W/2906C Adapter $349.95
External Configuration

APS HyperDAT® II

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The APS HyperDAT II is perfect for desktop backups. With standard 120m DDS-2 tapes the APS HyperDAT II can backup up to 4GB of data. The HyperDAT II can also use economical 60m and 90m tapes. Ships with backup software and includes a two-year warranty.

Desktop backup just $749.95
External Configuration

APS HyperDAT® IV

- Longer tape, higher density vault DDS-4 into network backup capability
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Retro/Cheyenne $1,399.95
External Configuration

APS TAPE BACKUP SYSTEMS

Model	Description	Internal	External
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APS NS-20	Travan-5/NS20/QIC	499.95	549.95
APS HyperDAT® II	DDS-2/DAT (4-8GB)	549.95	599.95
APS HyperDAT® III	DDS-3/DAT (12-24GB)	979.95	1,029.95
APS HyperDAT® IV	DDS-4/DAT (20-40GB)	1,299.95	1,349.95
APS DDS-3 Autoloader	4mm DDS-2 AutoLoader (96-192GB)	N/A	3,199.95
APS DLT40	DLT 4000 (20-40GB)	N/A	1,999.95
APS DLT70	DLT 7000 (35-70GB)	N/A	3,999.95
APS AIT Plus	8mm Advanced Intelligent Tape (35-70GB)	N/A	1,999.95
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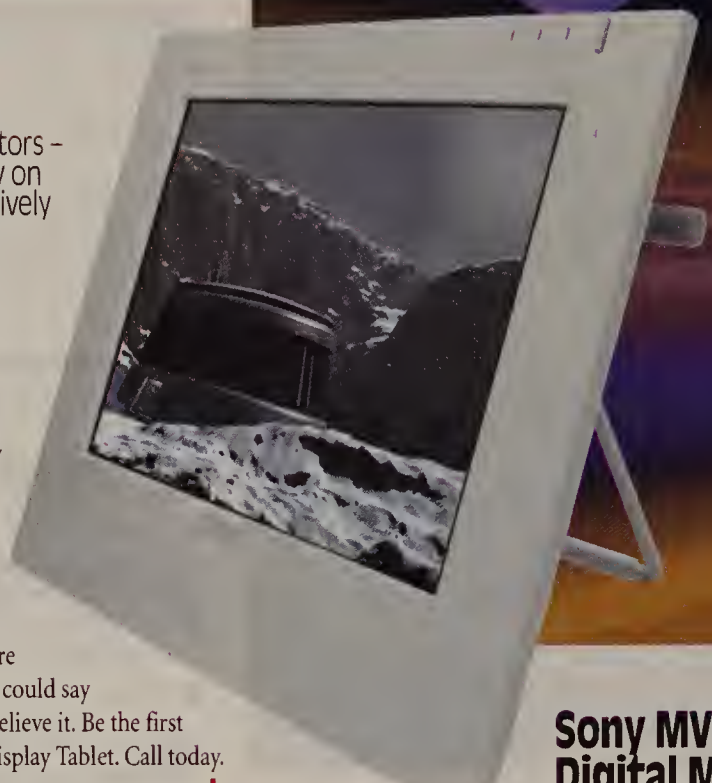

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MVC-FD91

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108357	BP650S	650	410	35-40 MIN	3	3	6.6 X 4.7 X 14.5	269.95
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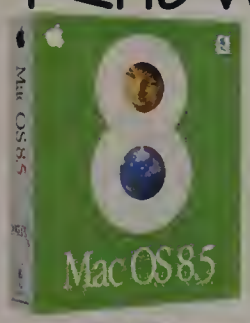

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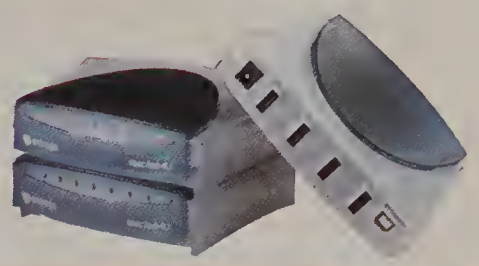

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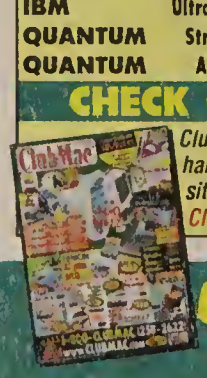

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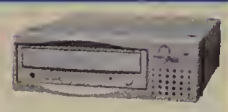

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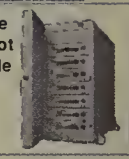

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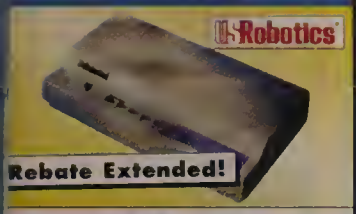

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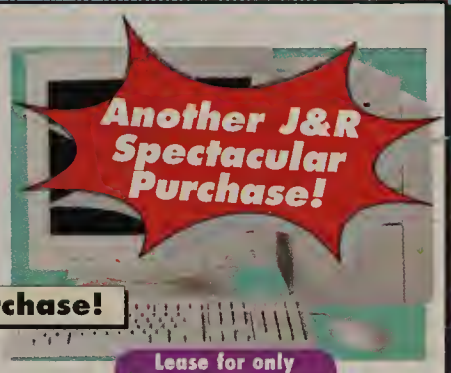

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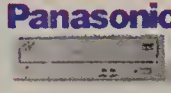

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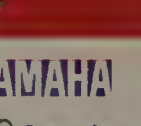

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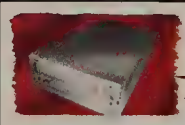

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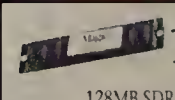

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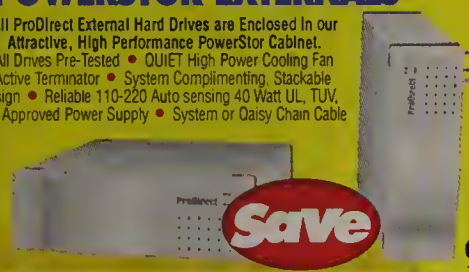

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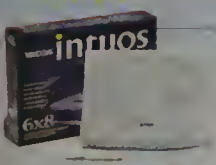

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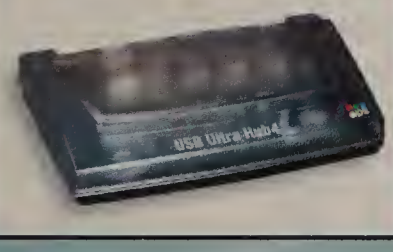

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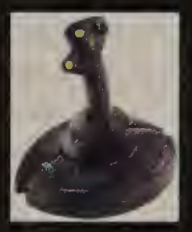

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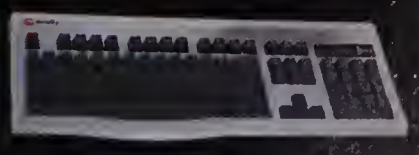

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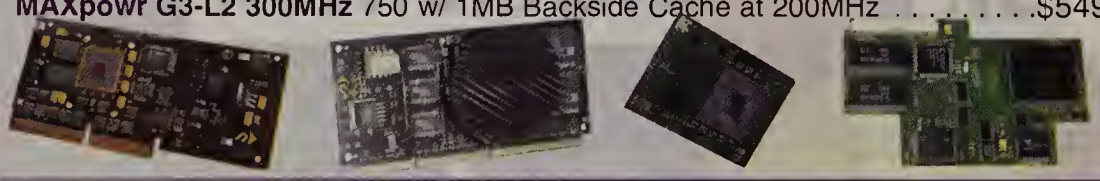

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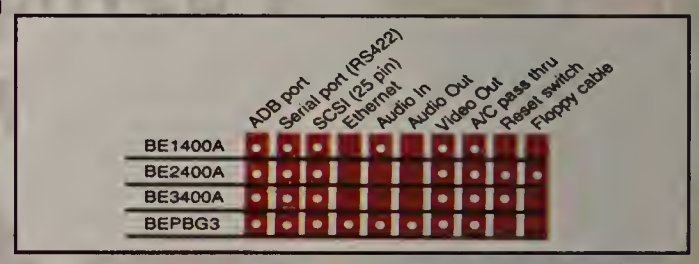

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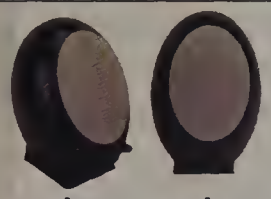

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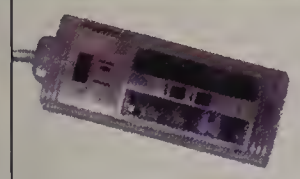

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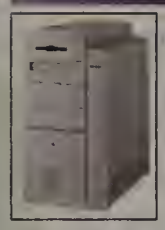

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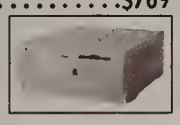

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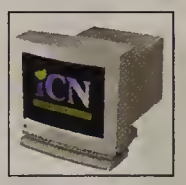

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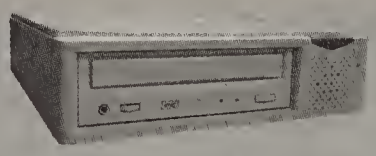

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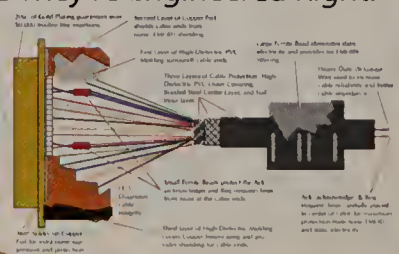

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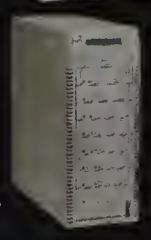

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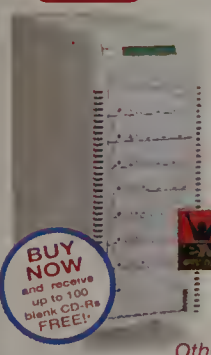

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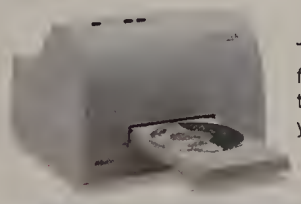

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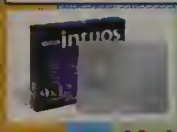

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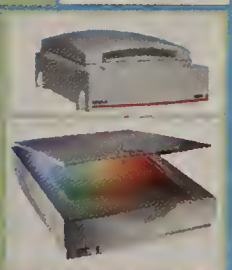

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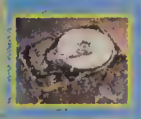

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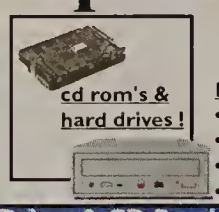

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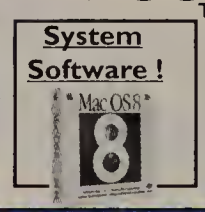

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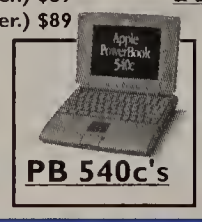

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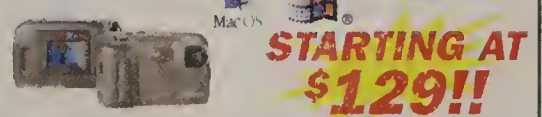

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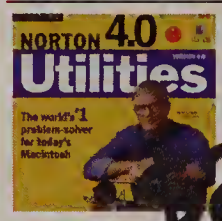

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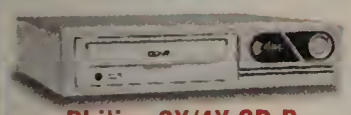

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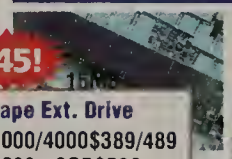

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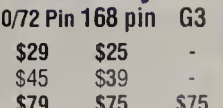

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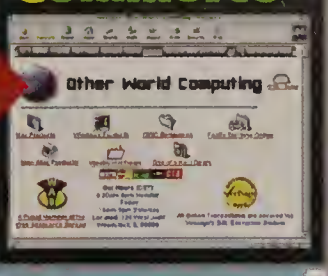

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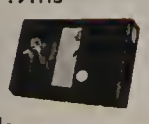

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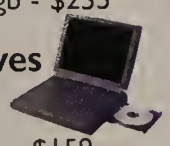

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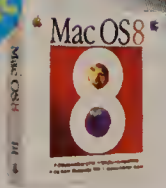

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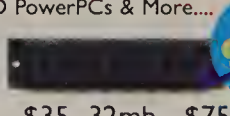

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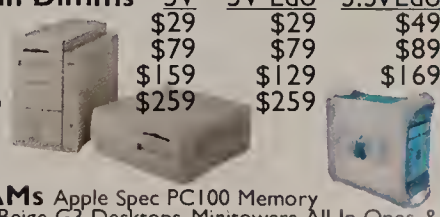

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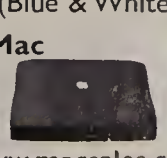

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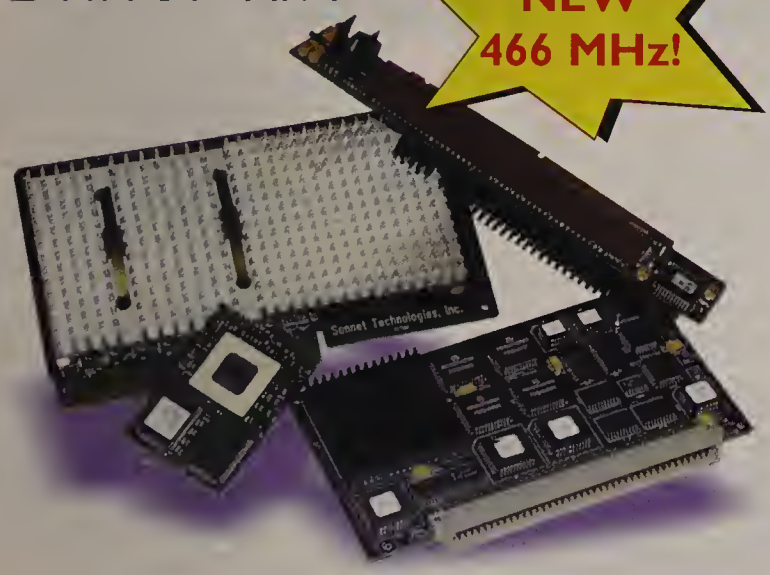

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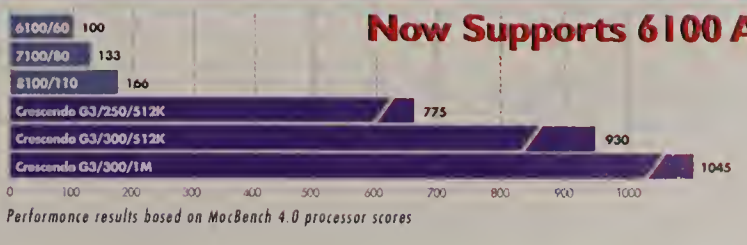

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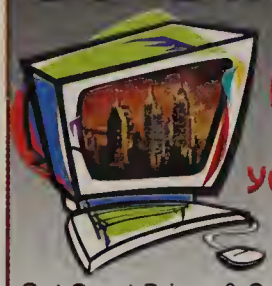

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The Desktop Critic

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Lies, Damn Lies, and Statistics

YOU CAN FIND NUMBERS THAT SAY ANYTHING—ESPECIALLY IF YOU MAKE 'EM UP

MEGABYTES, megahertz, market share—you can't have a conversation about computers without trotting out numbers. Yet the sloppiness of today's high-tech numberology is appalling. Let's try this example: how many Americans are online? Research firm IDC nails it squarely at 38 million; Mediaquest says 53 million; Intelliquest says 73 million people are online, almost double IDC's estimate.

Now let's say you're writing a *Wall Street Journal* article about how TV is doomed because of the Internet's rise. Which number would *you* pick?

See the problem? We worship statistics, measurements, and specs, but the numbers are often figments of somebody's agenda. Here are a few we could start correcting right now:

56K Modems How is that label misleading? First, *56K* should be *56k*, referring to kilo*bits* per second, only an eighth as much as kilo*bytes*, the K that we're all used to. Second, the FCC sets a 53-Kbps maximum speed, because stronger signals cause phone-line interference. Third, even 53 Kbps is theoretical; most people get 46 Kbps on a good day. And fourth, that speed is only for receiving data. All 56-Kbps modems *send* data at only 33 Kbps. In other words, *56K* is the most fraudulent spec in the industry. Ralph Nader, where are you?

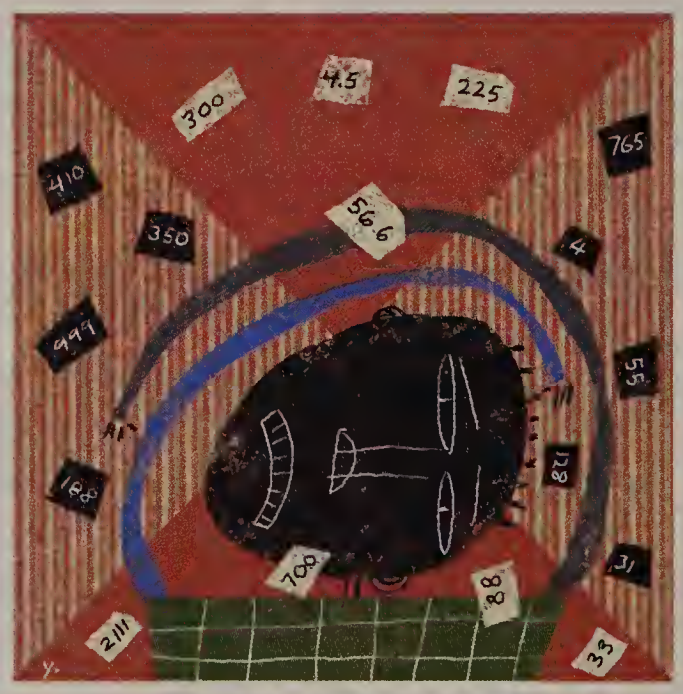
List Prices What a wacky system: each company picks a pie-in-the-sky price for each product. That way, every catalog and store can sell it for half as much, promising us a fantastic discount.

Trouble is, *nobody* sells software for list. Digital Origin's EditDV goes for $899—list. But even the company's own Web site sells it at $499. Why don't we end the charade and talk about the actual prices? (*Macworld* will soon do its part by publishing averaged prices from several national stores rather than list prices.)

Suggested Memory Size When I was having trouble with Internet Explorer, a Microsoft tech rep's first suggestion was to change the suggested RAM allotment from 4 megs to 8.

In other words, software companies pressure their programmers to set memory sizes too low—for marketing purposes. We pay the price in stability.

Market Share Macs last a lot longer than Windows PCs. Millions of people still use their nine-year-old Mac Classics and IIsi's—but how many people still use that era's 386 (Windows 2.0) machines?



So, true enough, current Mac sales aren't a big slice of the pie—but the number we hear about, *sales* market share, is irrelevant (especially when the calculations are as goofy as research firm PC Data's: it tallies each color of iMac as a different model, making it impossible for the iMac to maintain its best-seller status). What really counts—when calculating the potential market for software and add-ons, for example—is how many Macs are in *use*. That number is much higher: 16 percent, by the estimate of the Software Publishers Association (SPA). But do we ever hear that statistic? Noooo!

Software Market Share "Windows applications accounted for 81 percent of the application software sold," says the most recent SPA report; "Macintosh sales represented just 11 percent." Scary, dude.

But the SPA's estimates are nearly useless, thanks to one little fluke: an increasing number of companies include Mac and Windows versions on the same CD. (According to the market-research service SofTrends' latest numbers, up to a third of software best-sellers are such hybrid CDs.) When you buy a hybrid CD, does the CompUSA checkout clerk ask which kind of computer you have? Of course not. All such sales are tallied as Windows sales.

Megahertz As far as the public knows, more megahertz is better. But this year's hot new blue 300MHz Power Mac G3 is actually slower than last year's *beige* 300MHz Power Mac G3 (because of the effect of other components)—and that machine is faster than a 300MHz Pentium (because MHz aren't comparable among different chip families). The world has yet to invent a consistent, overall speed measurement for computers.

Version Numbers Software version numbers are pure marketing concoctions. The upgrade from System 7 to System 7.5, for example, was a baby step compared with the leap from 7.5 to 8.0. If anything, it's the tiny increases that really count, because that's when a program goes from "4.0" buggy to "4.0.1" usable.

Of course, then there's the numbering leap from Word 6 to Word 98. *That* one seems about right. **m**

DAVID POGUE (www.davidpogue.com) cowrote *Macworld Mac Secrets*, fifth—or maybe sixth—edition (IDG Books Worldwide, 1998), which has sold somewhere between 50 and 50,000,000 copies.

JAMES YANG

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